Defense Dept. begins pilot test of model EDI network

Electronic Commerce Operation Net promises to reduce paper work, streamline purchasing.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — As expected, the Department of Defense this week will begin a pilot test of a prototype electronic data interchange network that promises to streamline the purchase of products used by the military.

Although only a handful of government suppliers and Defense Department procurement sites will be involved initially, officials emphasized that the Electronic Commerce Operation Network (ECON) pilot forms the nucleus of the military's strategy for eliminating paperwork in favor of end-to-end electronic delivery of data in the procurement process.

Defense Department officials said ECON will eventually supercede the few disparate EDI projects that have sprung up within the department, giving the private sector a common EDI network for procurement buyers.

A single EDI approach would eliminate industry complaints that 12 out of 15 EDI projects at the department require different equipment and procedures. In addition, it would speed up the procurement process and open it to more bidders by making it easier for small companies to participate.

Jack Bartley, project director

(continued on page 64)

Canadian Bank to upgrade LANs to LAN Server nets

Part of massive LAN deployment, downsize effort.

By Timothy O'Brien
West Coast Bureau Chief

TORONTO — The Royal Bank of Canada last week said that, beginning next year, it will upgrade more than 1,000 existing LANs to IBM LAN Server networks and install OS/2 on about 20,000 personal computers throughout its retail branch offices in Canada.

The bank, which plans to install a total of 1,600 branch local-area networks by 1993, will offload account data and key banking applications from mainframes in its major data centers to the branch nets running LAN Server and IBM's OS/2 Extended Edition data base server.

"We're taking client information that is the lifeblood of our company and making it [more] accessible to users on a daily basis," said George Oliver, manager of information delivery technology for the Royal Bank of Canada here.

Until the end of this year, the bank will continue installing token-ring networks running Performance Technology, Inc.'s PowerLan, an inexpensive network alternative providing simple server-based file- and print-sharing capabilities. The bank also has approximately 70 LANs running Novell, Inc.'s NetWare in its corporate offices.

With more than 70M bytes of

(continued on page 63)

Intel pushes into market with new LAN products

By Bob Brown
Senior Editor

HILLSBORO, Ore. — Intel Corp. will make its first big push into the local-area network market next month when it unveils a bevy of new products, including interface cards and network analyzer software.

Intel will roll out a line of interface cards for both Ethernet and token-ring networks. The Intel Ethernet cards are expected to be about half as expensive as typical Ethernet cards and could force other vendors to respond with price cuts, analysts said.

The network analyzer software includes new offerings as well as some repackaged products previously sold by Intel and a company it acquired earlier this year, they said.

An Intel spokeswoman last week confirmed that the Intel Product Group plans an announcement by mid-September to introduce more than 10 new networking products that will be rolled out in the fourth quarter. She described the announcement as Intel's "biggest thrust into the network market to date."

Brad Baldwin, an analyst at the Santa Clara, Calif., office of

(continued on page 8)

Briefs

Feds take EDI stance. The General Services Administration and the Defense Logistics Agency last week said they would meet with the Office of Management and Budget to establish an interagency council on electronic data interchange. The council will work to coordinate government EDI activities.

The Department of Defense also said it wants to integrate EDI into the department's Computer Aided Acquisition and Logistics Support program, under which vendors in weapons programs must deliver graphics and other data in standard electronic formats by 1992.

Banyan goes SCO. Banyan Systems, Inc. is expected to announce at the SCO Forum91 Conference tomorrow its VINES network services software for The Santa Cruz Operation's (SCO) Unix.

Rather than port the full file- and print-sharing components of the VINES network operating system, early reports indicate that Banyan has opted to make key network services, such as wide-area network capabilities and its global naming system, available for the popular Unix operating system.

As reported in an interview with Dave Mahoney, Banyan's president and chief executive officer ("Banyan to open VINES' net services," *NW,* May 13), the LAN vendor plans to make its network services available on a variety of Unix platforms.

Tastes great, less filling? Sources close to Novell, Inc. last week confirmed the company is nearly ready to release NetWare Lite, a peer-to-peer version of the NetWare network operating system. It will be priced at about $99 per node. Although Novell would not confirm the news, several sources predicted Novell will announce NetWare Lite at the upcoming NetWorld '91 Dallas trade show to be held in mid-October.

A forum for viruses. CompuServe Information Services has started a new forum dedicated to the topic of viruses. Like all CompuServe forums, the Computer Virus Forum offers a message section for users to ask questions and exchange information. Currently, there are three areas for messages: one specifically for questions about the antivirus products of Santa Clara, Calif.-based McAfee Associates, which sponsors the forum; another for general questions and answers about viruses; and a section for virus news and views.

The forum maintains a library that contains downloadable McAfee Associates antivirus programs and other shareware antivirus programs. Users can also upload for analysis files they suspect are infected with a virus.

Two more join UDF. This week, the Unshielded Twisted Pair Development Forum will announce the addition of two new members: British Telecommunications PLC and Hewlett-Packard Co. The group will also present preliminary research and test results on its specifications for a 100M bit/sec Fiber Distributed Data Interface network over unshielded twisted pair to the ANSI X3T9.5 at a meeting in Boulder, Colo. The initial goals of the research, according to the forum, are to develop signaling techniques that can meet Federal Communications Commission emission specifications over targeted distances.

Belgian carrier picks new leader. Bessel Kok, chief executive officer and founder of the Society for Worldwide Interbank Financial Telecommunication, S.C. (SWIFT), an international banking network, has been chosen to head Belgacom, the commercially oriented successor to Belgium's state-run Regie des Telegraphes et Telephones (RTT). Belgacom will be created later this year when the Belgian Telecommunications Act takes effect, splitting RTT into an operations organization headed by Kok and a regulatory body. Kok founded SWIFT in 1973, and has overseen its growth as a provider of international financial telecommunications services into a company with annual revenue of about $300 million.

Two shirts and caller ID, please. Bell Atlantic Corp. last week launched a market trial in which it will sell such services as caller ID and call forwarding through department stores. The services will be sold in stores' electronics departments. The trial began last Friday at Hecht's, a 27-store chain in the Baltimore, Richmond, Va., and Washington, D.C. areas. If the trial is successful, the company plans to expand the program to other retailers.

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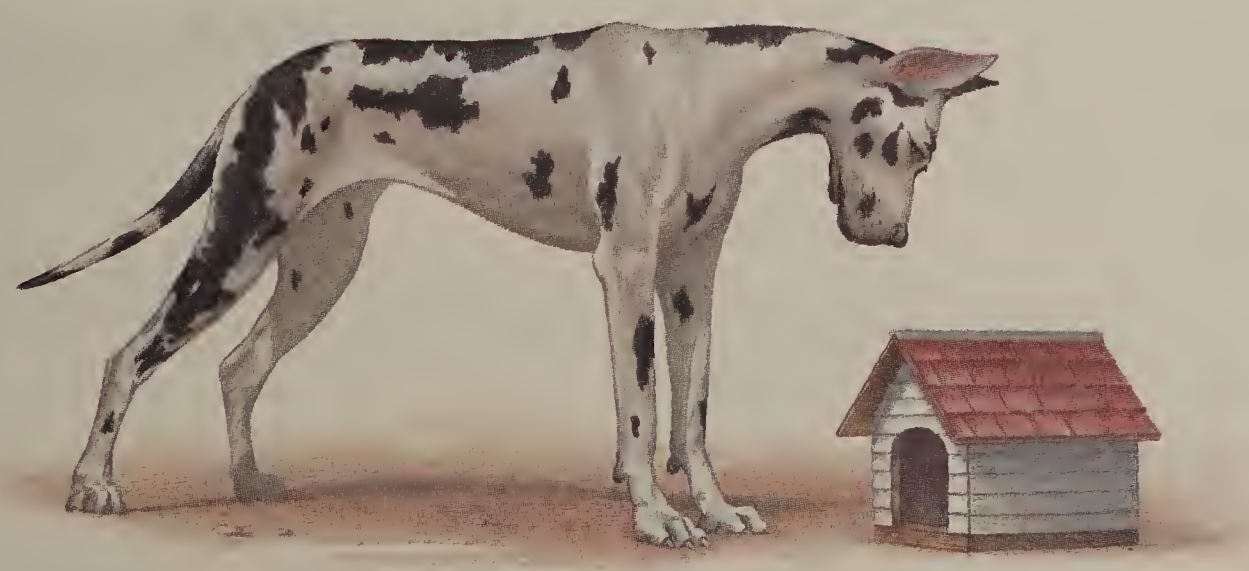

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Open systems executives dispel industry myths

By Wayne Eckerson
and Bob Wallace
Network World Staff

CHICAGO — Open systems pioneers last week took aim at the misconceptions stymieing user deployment of standards-based enterprise networks.

Speaking at the Manufacturing Networks Conference, which was cosponsored by *Network World* and Digital Consulting, Inc., executives from companies such as General Motors Corp., Hughes Aircraft Co. and Budd Canada, Inc. tried to dispel the myths about open systems being immature or unavailable and urged users to start implementing them.

PHOTOS © 1991 ROURKE JOHNSON

Saturn net chief Dave Skivens at conference.

Speakers emphasized the need to streamline business processes and create an enterprise net architecture before applying information technology. They also stressed the importance of educating and empowering workers in order to make the most of technology investments.

The conference was backed by the North American MAP/TOP Users Group and the Society of Manufacturing Engineers.

Michael Kaminski, GM's computer-integrated manufacturing/Networking Technologies manager, said GM has reaped many benefits from the Manufacturing Automation Protocol, which it began using in 1985 and now uses in 36 factories.

"MAP is the keystone of the architecture that will give us application portability," Kaminski said. "We save the time and money needed to write applications interfaces for each computer system we have."

GM also saves in maintenance, wiring and spare parts inventory by using MAP in place of proprietary systems. "And it's easier to monitor devices attached to a MAP network than it is to try and manage them individually," Kaminski said.

Jack Rathsburg, senior administrator for GM's Truck & Bus Group, added, "There is no reason to wait. MAP is mature, the technology is proven and there are plenty of affordable MAP products on the market."

Three of GM's 16 Truck & Bus plants implemented MAP nets in the mid-1980s, and several others have followed suit. A longtime proponent, Rathsburg said MAP is less expensive, more reliable and easier to use than vendor-proprietary systems.

"Because MAP is a [single] protocol, we've been able to eliminate 14 potential points of failure [in our net]," he said. "We have reduced our costs dramatically by eliminating all those interfaces."

John Goodfellow, Budd Canada's network manager, agreed that MAP is mature and said the company plans to add a MAP channel to the broadband network it in-

(continued on page 64)

We want to hear from you. *Network World* has set up a toll-free number you can use to leave news tips or letters to the editor. Let us know what's going on or how you feel about the stories you read in our publication. Call (800) 622-1108 and ask for Ext. 487.

Line of access devices for switched services launched by Newbridge

By Bob Brown
Senior Editor

HERNDON, Va. — Newbridge Networks, Inc. last week unveiled a new product line designed to enable customers to use the increasingly attractive array of switched services offered by public network carriers.

The Transmission Access Processor (TAP) product family consists of 10 products, including an inverse multiplexer, a data service unit/channel service unit (DSU/CSU) and several signal converters.

The TAP products are designed to accommodate emerging high-bandwidth applications, such as videoconferencing and LAN-to-LAN connections, by letting users establish dial-up, high-speed digital links on an as-needed basis.

Some of the TAP products will be available in the fourth quarter, while the rest will be rolled out next year.

"Newbridge historically has been successful in the access marketplace with our channel-bank products," said Edward Kennedy, the company's vice-president of marketing. "We're going back and placing more emphasis on the access marketplace now that carriers are repositioning their switched services and tariffs, and users' data requirements are changing."

While many vendors are starting to roll out access products (see "Flood of new switched service access devices expected by TCA," this page), Newbridge hopes to differentiate itself by offering a complete line of access devices rather than just one or two products, he added.

TAP 5000

The premier product in the TAP line is the TAP 5000 Virtual Channel Unit. The TAP 5000 is designed to support high-

(continued on page 63)

Newbridge's switched access data network products

Product	Features	Availability	Price
TAP 5000 Virtual Channel Unit	Uses a T-1 or ISDN Primary Rate Interface into the public network to support switched 56K or 64K bit/sec circuits.	Late 1991	$5,000 to $9,000 (depending on configuration)
TAP 1000 T-1 Access Processor-Channel Service Unit	CSU that supports speed dialing, signal conversion and other advanced features.	Late 1991	$3,000
TAP 5500 T-1 Frame Alignment Unit	DSU/CSU with up to 4 data ports, dial backup and time-of-day reconfiguration.	First quarter, 1992	$4,000
TAP 2000 T-1/ISDN Primary Rate Convertor	Signaling conversion between T-1-based central processing equipment and ISDN services.	First quarter, 1992	$4,000

CSU = Channel service unit DSU = Data service unit

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: NEWBRIDGE NETWORKS, INC., HERNDON, VA

Flood of new switched service access devices expected by TCA

Vendors prepare for increased need for on-demand services.

By Bob Brown
Senior Editor

In the months ahead, a flood of new products will come to market designed to help users take advantage of the growing variety and falling prices of switched public network services, according to industry observers.

Vendors are readying the products in anticipation that users will want on-demand digital transmission services to support applications such as videoconferencing, dial backup and local-area network internetworking.

The major carriers have been racing to roll out new and higher speed switched services, and now it appears there will be a variety of customer premises equipment available to use with the services.

Switched access products vary from vendor to vendor but typically let users access a public network switch via a local T-1 or Integrated Services Digital Network pipe and establish switched circuits from there on an as-needed basis.

Traditional network equipment makers such as Newbridge Networks, Inc. and Network Equipment Technologies, Inc. (NET), as well as start-ups such as Ascend Communications, Inc., Digital Access, Inc. and Network Express, Inc., are among the host of companies that have either joined the market or announced plans to do so.

Most of the activity in the market for access products has been on the leased-line side to date, but now vendors are starting to turn their attention to switched services, according to Rick Malone, a principal at Vertical Systems Group, a Dedham, Mass., market research firm.

Some users are already benefiting from the services and products.

"Our existing network was wasteful," a user who is testing videoconferencing via switched services said privately. "It was hard to justify dedicating lines to our videoconferencing rooms when they weren't being used much of the time. The combination of switched services and complementary CPE looks to be more efficient."

Established T-1 multiplexer vendors are looking to the switched access market as a new opportunity for growth since the domestic T-1 multiplexer market has slowed considerably, said Todd Dagres, an

(continued on page 61)

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Customs moves ahead despite EDIFACT delays

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — The top U.S. Customs Service officials in charge of electronic data interchange last week vowed to implement the EDI for Administration, Commerce and Transport (EDIFACT) standard this fall in spite of foot-dragging by other countries to approve the United Nations international standard.

Robert Ehinger, director of the office of automated commercial systems at the Customs Service, said the scheduled U.N. approval for the EDIFACT standard may be delayed yet again by Europeans intent on changing it.

But speaking at the 2nd Annual Conference and Exposition on EDI for Government, Ehinger said regardless of what the U.N. WP4 standards body decides this October, the U.S. will move forward this fall to implement EDIFACT for U.S. imports.

The reason for the U.S. stance, he said, is the Customs Service promised importers it would roll out support for EDIFACT this year and delays can no longer be tolerated.

For several years, the Customs Service has made available to importers an automated clearance system, based on proprietary EDI formats, to clear goods through customs.

But EDIFACT, a set of EDI transaction sets developed under the auspices of the U.N., is considered by the Customs Service as the key force in creating a global standards-based customs clearance system.

The Customs Service itself contributed the Customs Declaration transaction set, which is one of about six interim-approved EDIFACT message sets.

For over a year, the Customs Service has conducted an operational EDIFACT test pilot with participants such as ICI Americas, Inc. using the U.N.-approved interim version of EDIFACT, Status 1, for electronic customs declarations and approval.

> Ehinger said the scheduled U.N. approval for the EDIFACT standard may be delayed yet again.
>
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The WP4 committee's approval of the final version was expected last year, but disputes over some message formats stalled the final go-ahead on EDIFACT.

Colin Ungaro assumes the reins at Network World

FRAMINGHAM, Mass. — Network World Publishing Co. last week announced the appointment of Colin Ungaro as president and chief executive officer of the company and publisher of *Network World,* its flagship publication.

Ungaro was previously with CMP Publications, Inc. as group editorial director for *Communications Week, Communications Week International, Network Computing* and *Information Week.*

Prior to that, he was associate publisher of McGraw-Hill Publishing Co.'s Data Communications, a post he assumed after having served as editor of the magazine.

"Colin Ungaro brings ideal qualifications to the CEO position at *Network World,*" said International Data Corp. Chairman Patrick McGovern.

"He has a clear vision of the future of the networking market and excellent leadership skills, which will help accelerate the advance of Network World Publishing," he said.

Ungaro, who assumes his new post today, said, "The challenge for *Network World* and for me is building on the newspaper's leadership position and responding quickly to developments in this fast-growing market."

— Tracie Seder

Critics question imbalances in Tariff 12 services

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Despite assurances to Congress that it won't allow Tariff 12 to become a vehicle for deep discounts on a single service, the FCC last week allowed a revised Tariff 12 deal to take effect that is made up almost entirely of international service.

The Federal Communications Commission's Common Carrier Bureau approved changes to Option 23, despite AT&T projections that 89% of the revenue from the deal will come from international switched voice service. The deal was originally designed for Chemical Bank and was later purchased and modified by MCI Communications Corp., which wanted to buy only international service.

AT&T was not required to either file paperwork with the FCC when it added MCI or report the altered service mix.

In the past year, the FCC has threatened to reject Tariff 12 deals that contain a large percentage of 800 service because AT&T is dominant in that market. But the agency seems less troubled by deals with high percentages of international service, where AT&T is also dominant.

Approval of the modified Option 23 raises questions about whether the FCC has a consistent policy for maintaining a service mix in Tariff 12 deals and whether the agency is able to police the deals to ensure that the mix does not become skewed toward one service.

The issue is important because characterization of Tariff 12 as an integrated package of services not available under one tariff is key to the legal viability of the deals.

In order to provide discounts, Tariff 12 deals must be integrated packages and not just discounts of one offering. AT&T's first existing Tariff 15 deal, which offered a discount on a single service to a specific customer, was recently found unlawful by the FCC.

FCC Chairman Alfred Sikes told Rep. Edward Markey (D-Mass.) in a written statement last month that the agency is vigilant in reviewing Tariff 12 deals to ensure they are truly packages and not single-service discounts.

"Given the definition of Tariff 12 as an integrated package providing a number of service functionalities, the Common Carrier Bureau . . . attempts to ensure that no option is so dominated by a single service feature that [it] no longer represents a package of numerous features and functionalities," Sikes said.

But Carl Lawson, deputy chief of the Common Carrier Bureau, which reviews tariffs, said there is no set rule for reviewing deals.

"I suppose if we ever reject one of these [Tariff 12 deals] it would produce some kind of rule," he said. "I would think that if something is 90+% Service A, that would set off alarm bells."

If FCC officials became concerned about the high percentage of international service or any other service in Tariff 12 deals, the agency could open an investigation and reject options as unlawful — even though they have already taken effect, said Kenneth Robinson, senior advisor to Sikes. However, Robinson was unaware of any complaints about the level of international service in Tariff 12 deals.

Last year, the FCC threatened to reject two Tariff 12 deals that included a large amount of 800 service, Sikes told Markey. The two deals — Option 56 for National Data Corp. and Option 65 for Farmers Insurance — contained between 80% and 90% of 800 service.

AT&T withdrew National Data Corp.'s deal and scrapped the offending revisions it had proposed for Farmers Insurance.

"Although these particular instances involved predominantly an inbound service functionality, the bureau would be concerned with the predominance of *any* one service functionality," Sikes wrote to Markey last month.

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New NetWare-specific virus poses threat

continued from page 1

for the presence of the NetWare shell. If the shell is present, the virus checks to see if the user login request has been encrypted. If the password is in clear text, the virus broadcasts a copy of the login to a special address on the network.

Using a small program, the perpetrator of the virus can then retrieve the password information, granting him access to virtually any network resource.

Threat or hype?

To date, GP1 has only surfaced in virus research organizations and companies that make antivirus products and has not actually infected any user networks. Sources familiar with the virus say it was created as a challenge to NetWare security and was never meant to be let into the public domain.

However, the virus has already cropped up around the world. Tippett said the virus was sent to him from Europe. And according to Harold Highland, a security specialist based in Elmont, N.Y., it exists in Eastern Bloc countries as well.

Although created without malicious intent, Tippett and Highland both expect GP1 will find its way into user networks. "I assume this will get to the public," Highland said. "This is something [users] have to be aware of."

Highland said the likeliest targest will be the more secure networks. There is little need to use the virus to collect passwords in networks where user passwords are something easy to guess, such as the users first name.

But in networks where passwords are random groups of letters and numbers, this type of virus would make it easier to breach security.

According to Tippett, the virus was sent to him as uncompiled source code, not as a program. On the one hand, that is good news because the virus cannot do any damage until it is actually compiled. But on the other hand, because copies of it are being distributed as source code, anyone can see how the program is written and easily duplicate it or even write a similar virus.

"I estimate we may see a NetWare specific virus [in the user community] within six to 12 months," Tippett said.

Other sources were not as concerned about the virus. McAfee, for example, said the virus didn't work.

"This is based on the Jerusalem virus, but it's full of bugs and does not function," he said. "The problems could be easily corrected, but at this point, it just does not work.

"There will not be a threat from this virus," he continued. "This virus is meaningless."

Novell confirmed the existence of the virus, its name and that it was designed specifically for the NetWare environment. But the company said it is not a threat for versions of NetWare released after 1987 — which include NetWare 3.0, 3.1 and 3.11 — because these versions have a password encryption option, which renders the virus useless.

> "I estimate we may see a NetWare-specific virus [in the user community] within six to 12 months," Tippett said.
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Sources disagreed about whether the virus would be a threat in these environments. They pointed out that, although the encryption option is there, only a small number of users use it.

No matter how much of an actual threat the virus represents, users expressed concern when informed of its existence. "This makes me very uneasy," said Rod Padilla, systems analyst at Georgia State University, when told about the virus. "We're an educational institution with 12 servers. We've got a lot of people using our services here, and we're very open to this kind of attack."

Intel pushes into LAN market

continued from page 2

Gartner Group, Inc., a market research firm, said Intel has been plotting to get into the LAN market for two years.

"Intel is serious about the LAN business and has made a big investment to enter the market," he said. "Because Intel makes a lot of its own components, it should do well in the adapter card market by offering rock-bottom prices."

Intel's involvement in the market has been limited to date. The company offers the NetPort line of print servers and provides Ethernet chipsets used by other firms to build interface cards. However, the firm boosted its presence in the LAN market in May when it acquired LANSystems, Inc.'s Network Products Division. The assets acquired included a variety of network utility products, such as print servers.

Among the products to be announced are the EtherExpress 16 LAN Adapter for thin or thick coaxial wire networks, which costs about $200; the EtherExpress 16 TP LAN Adapter, an Ethernet adapter for unshielded twisted-pair networks that will

(continued on page 62)

Worth Noting

Computer-integrated telephony "standards are extremely important, not only to help vendors develop good products, but to help small companies buy those products."

Arkady Grinberg
Chairman of the ANSI T1S1.1 Integrated Services Digital Network networking group responsible for the Switch-Computer Application Interface standard
Livingston, N.J.

People & Positions

Hughes LAN Systems, Inc. recently announced the promotion of **Peter Filice** to the new position of vice-president of customer service.

He will be responsible for application engineering, service marketing, customer support operations and field services.

Previously, Filice served as director of product marketing. He has also held several other senior positions in sales and technical support during his nine years with the company.

Richard McGinn, formerly president of AT&T Computer Systems, has been named to the newly created position of senior vice-president of strategy, sales and customer operations for **AT&T Network Systems.**

McGinn will be responsible for the strategy behind growing AT&T Network Systems, as well as its worldwide sales force, marketing planning, customer operations and engineering.

He will report to William Marx Jr., AT&T group executive and president of AT&T Network Systems.

Since the announcement of the AT&T's acquisition of NCR Corp., McGinn has been co-chairman of the team managing the transition of AT&T's computer business from AT&T Computer Systems to NCR.

Spec lets data gear make switched calls on demand

Ascend, Cisco to offer spec to other vendors.

By Ellen Messmer
Washington Correspondent

MENLO PARK, Calif. — Ascend Communications, Inc. and Cisco Systems, Inc. last week discussed plans to offer a specification that enables routers and other data terminal equipment (DTE) to automatically establish high-speed switched digital calls over the public network.

The specification, based in part on the CCITT V.25bis standard, would allow DTE devices to signal data communications equipment (DCE) such as Ascend's Multiband Bandwidth-on-Demand Controller to set up switched connections with a local or interexchange carrier on the fly to accommodate peak traffic conditions.

The specification will describe the synchronous protocol used to establish the connection between the DTE, such as a Cisco router, and DCE, such as an Ascend controller.

Both vendors will offer the specification to other competitors in hopes it will be adopted industrywide. Ascend and Cisco will make the specification generally available on Sept. 1.

"Internetworking users get two benefits from this joint effort: transparent autodialing of high-speed switched digital services and the associated cost savings realized when transmitting data over the public switched network," said David Helfrich, Ascend's vice-president of sales and marketing.

Ascend plans to implement the remote control call interface during the fourth quarter of this year in its Multiband Bandwidth-on-Demand Controller, he said.

Christine Hemrick, wide-area network product manager for Cisco, declined to say when her company would add the remote call procedure capability to its routers, though she hinted it would be soon.

"Today, V.25bis is used by modems to dial up on analog circuits," she said. "Instead, we are using it to allow routers to access digital circuit switched lines, such as Integrated Services Digital Network."

Using the specification, the DTE can make calls over T-1/E-1, fractional T-1, ISDN Primary Rate Interface and Basic Rate Interface lines.

"For the first time, intelligent internetworking routers can control switched digital calls at up to 4M bit/sec, sensing when a line is needed or when a line is about to

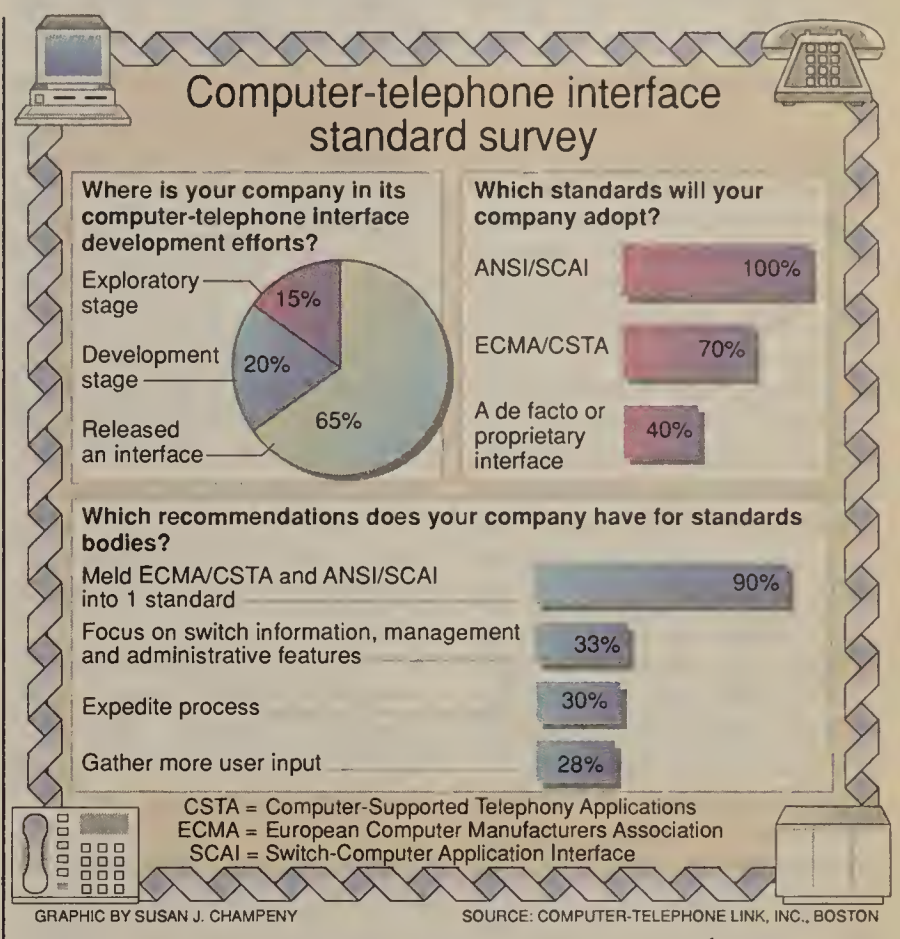
(continued on page 11)

INDUSTRY BRIEFS

Yale goes the distance with MCI. MCI Communications Corp. last week said it has signed a four-year, $8 million contract with Yale University for long-distance services. Yale, which currently operates YALENET, its 17,000-line local campus network for students, will now use MCI for domestic and international long-distance service. The carrier will supply Vnet virtual private network services to Yale business offices in New York and Norfolk, Conn., as well as provide 800 numbers for Yale recruitment purposes. Additionally, MCI is supplying a T-1 link from New Haven to Stamford, Conn., for access to the National Science Foundation Network.

X/Open reorganizes. X/Open Company, Ltd., of Menlo Park, Calif., last week said it has begun an internal reorganization aimed at giving greater decision-making powers to software vendors and users within X/Open. Bob Lewin, North American vice-president of operations, said X/Open traditionally had funded hardware vendors in standards development work. In the future, X/Open will direct funds to solve problems in software and will broadly address users' technical and business-related concerns, he said.

The realignment decision was reached in July at a meeting in the U.K. of X/Open's worldwide board of directors, during which Andy Roberts was elected to succeed Jim Bell as chairman. An internal advisory committee will submit for approval a new implementation plan in October for the realignment to the X/Open board.



Concern arises about dual CIT standards

Fearing differences could slow availability of CIT applications, some call for a unified standard.

By Bob Brown
Senior Editor

Even as two prominent standards bodies move closer to finalizing their own versions of a computer-integrated telephony (CIT) standard, demand is growing in the industry for a united CIT architecture based on a single standard.

Emerging CIT standards from both ANSI and the European Computer Manufacturers Association (ECMA) are designed to help users link different vendors' telecommunications equipment and computers to support integrated voice/data applications. They are intended to speed development of applications by small software firms.

But some observers believe that differences in the two standards could create confusion and interoperability problems, slowing development of CIT applications and further delaying the long-anticipated growth of the CIT market.

"It's in the best interest of the user community to have a single standard," said Jim Burton, president of Computer-Telephone Link, Inc., a market research firm in Boston. "It would help in rolling out [CIT] applications on heterogeneous networks."

But others believe that development of any CIT standards is a positive step and that the two standards will probably merge over time.

Carl Strathmeyer, director of marketing for Digital Equipment Corp.'s CIT program, agreed that a single standard would be ideal but described the two emerging plans as complementary. "The two groups just have different priorities," he said. "They'll eventually get together."

The Integrated Services Digital Network networking subgroup of ANSI's T1S1.1 committee last week met to work on the Switch-Computer Application Interface (SCAI) standard, which the group hopes to issue as a draft standard by early next year.

> "It's in the best interest of the user community to have a single standard," said Computer-Telephone Link's Burton.
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The emerging North American SCAI specification, a rigid standard focusing on telemarketing applications, is supported by a group of computer, private branch exchange, central office switch and software vendors. It is

(continued on page 10)

IBM inks users in flurry of lucrative outsourcing deals

By Wayne Eckerson
Senior Editor

WHITE PLAINS, N.Y. — IBM's new outsourcing subsidiary, Integrated Systems Solutions Corp. (ISSC), struck gold recently, signing three outsourcing contracts with a combined worth of millions of dollars.

The contracts, two with supermarket chains and one with a shipping company, give ISSC the recognition and momentum it needs to make significant inroads into the outsourcing services market and compete more effectively against major rivals, according to industry observers.

The deals also reflect ISSC's success in marketing its services to a wider range of industries.

ISSC has signed two other major outsourcing contracts since it was formed in May. It also assumed responsibility for five more outsourcing deals IBM signed prior to its inception, including the landmark Eastman Kodak Co. deal. Of those eight contracts, six were with banks.

An IBM spokesman added that ISSC has also signed hundreds of smaller contracts with firms for other services.

According to Susan McGarry, vice-president of computing at The Yankee Group, a market research firm in Boston, IBM was in the process of negotiating several outsourcing contracts, including the deals made public last week, when it announced the formation of ISSC earlier this year. The move made several of the potential customers uneasy, raising questions of whether IBM would hold on to ISSC if it failed to turn a profit.

"It's a big deal for companies to outsource their computer and network operations," she said. "Obviously, ISSC was able to ease [customers'] concerns."

ISSC will manage computer operations and develop new business and point-of-sale applications for Supermarkets General Corp., which owns and operates Pathmark stores in the mid-Atlantic states.

Under the contract, 150 employees of Supermarkets General will be transferred to IBM, which will run the firm's data processing operations out of an ISSC facility in central New Jersey. Besides new point-of-sale systems, ISSC will develop and operate an integrated purchasing and warehouse application, new financial systems and electronic data interchange capabilities.

Handing nets over to IBM

Big Blue's outsourcing deals:

- **Bank South, N.A.** Atlanta
- * **Capital Bancorp** Miami
- * **Cullum Companies, Inc.** Dallas
- **Eastman Kodak Co.** Rochester, N.Y.
- **First Tennessee National Corp.** Memphis, Tenn.
- **Hibernia National Bank** New Orleans
- * **Matson Navigation Company, Inc.** San Francisco
- **The Riggs National Bank of Washington D.C.** Washington D.C.
- * **Supermarkets General Corp.** Woodbridge, N.J.
- * **Zale Corp.** Irving, Texas

* Deals signed since formation of IBM's Integrated Systems Solutions Corp. on May 15.

SOURCE: THE YANKEE GROUP, BOSTON, AND IBM, WHITE PLAINS, N.Y.
GRAPHIC BY SUSAN J. CHAMPENY

Specific terms of all three contracts were not disclosed.

The other supermarket chain to sign with ISSC is Cullum Companies, Inc.,which operates about 80 stores in Austin, Dallas and Fort Worth, Texas. Under the agreement, ISSC will operate Cullum's data center, voice and data network, and warehouse and order-entry systems.

John Torres, a vice-president at the market research firm Ledgeway/Dataquest in Framingham, Mass., said it doesn't surprise him that ISSC is pushing to provide outsourcing services to the grocery industry. Torres, who spent 23 years at IBM, said the computer maker has for many years focused on developing systems for the retail and grocery industry.

"IBM has a good product line for retail and grocery stores," he said.

The third contract was signed with Matson Navigation Company, Inc., a carrier of containerized freight between the West Coast and Hawaii.

ISSC will handle Matson's data processing operations out of an ISSC facility in Boulder, Colo. It will also manage Matson's data network and provide disaster recovery services.

Concern arises about CIT

continued from page 9

designed to let users easily move an application from one computer or PBX to another.

ECMA is near completion of its proposed European standard, dubbed the Computer-Supported Telephony Applications (CSTA). CSTA is a more loosely defined standard than the SCAI standard but will initially support more applications. It is only designed to work with PBXs, not central office switches.

Many vendors, including AT&T, IBM and Northern Telecom, Inc., send representatives to both ANSI and ECMA meetings, though some vendors favor one standard over the other.

AT&T has introduced its own CIT interface called the Adjunct/Switch Application Interface (ASAI). The telecommunications giant is said to be a big backer of CSTA since applications designed to work with ASAI would likely comply with CSTA without much modification. European vendors, such as Siemens AG, have also embraced CSTA.

A melding of the two standards appears unlikely in the near term, though the two stan-

dards-setting bodies share information on a regular basis, said Ian MacMillan, the liaison between ECMA and ANSI's SCAI group.

Arkady Grinberg, chairman of ANSI's SCAI group and a member of Bell Communications Research's technical staff, said a single standard could help drive the CIT market in several ways.

Hardware and software vendors could save thousands of dollars by working with a single interface, enabling them to offer CIT products at lower prices. If they have to work with multiple interfaces, they will likely pass the costs on to users, he added.

Ron Charnock, president of NPRI, Inc., an Alexandria, Va., maker of CIT application software, said it would cost his company about $250,000 to write each separate CIT interface, a proposition that could limit the number of interfaces his firm will support.

Charnock said he is less concerned about this, however, than the inability of vendors to find the right marketing strategy to sell CIT applications.

A spokesman for Northern Telecom, which recently established a CIT marketing group, said users rarely bring up standards concerns when the firm pitches CIT applications. Several other vendors confirmed this.

"First, the market has to be established," the spokesman said. "Then you can worry about standards."

Settling differences

The differences between SCAI and CSTA could wind up being settled on an international basis if the International Standards Organization (ISO) chooses a CIT standard, MacMillan said. AT&T has already started urging ECMA to recommend CSTA to ISO as a possible international standard.

"ISO would be the next logical step for these standards," he said. "There are some glaring differences between SCAI and CSTA. I suppose we'll see which one the vendors really want when it comes to forming an ISO standard."

Bull focuses on network integration

By Ellen Messmer
Washington Correspondent

BILLERICA, Mass. — Bull HN Information Systems, Inc., a Group Bull SA company, recently announced the formation of a systems integration unit to provide a variety of network integration services for commercial users.

The company's Integrated Information Solutions (IIS) division is targeting local-area network integration, imaging systems, client/server applications and network security implementation as key areas for growth.

Stephen Gardner

Axel Leblois, president and chief executive of Bull HN Information Systems, appointed Stephen Gardner, formerly vice-president of North America Marketing at Bull HN, as president of the new unit.

Gardner said demand from corporate customers to provide connectivity or installation of multivendor systems for enterprise networks was a driving factor in the formation of the IIS division by Bull HN.

Demand for systems integration services has come from companies such as Metropolitan Life Insurance Co., where Bull HN integrated personal computers and LANs into the company's network, he said.

While Gardner acknowledged that the systems integration field is already crowded with a multitude of vendors, he said Bull HN's new unit will be able to separate itself from the pack.

"We already do $70 million in maintenance [for companies] annually between the U.S. and Canada," he said, adding that much of that revenue is earned by concentrating on LAN support services.

By forming a separate unit, IIS will further extend the reach of the company into other systems integration areas such as outsourcing, Gardner noted.

IIS now has two offices — one in Billerica and the other in Phoenix. A third is likely to be set up soon in Minneapolis.

Spec makes switched calls

continued from page 9

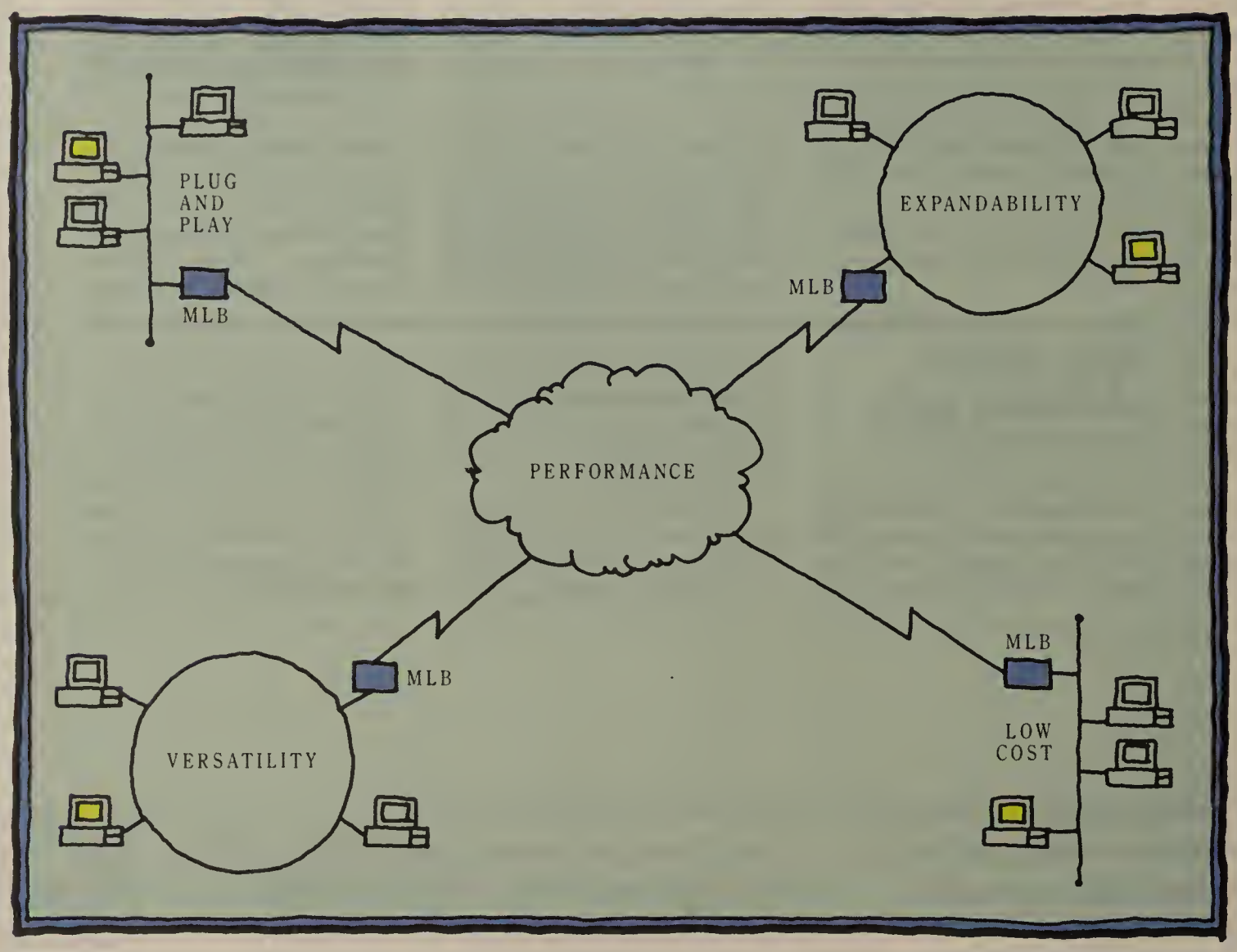
be saturated and requires additional bandwidth," Hemrick said.

According to Ascend's Helfrich, his company and Cisco have no immediate plans to submit their extension to V.25bis as a proposed international standard, although they may approach standards bodies in the future with their joint work.

Helfrich called the standards process too slow, emphasizing that Ascend wanted to bring the remote call procedure capability to market as soon as possible.

"The rapidly growing list of high-speed switched digital services now being offered by the common carriers worldwide is clearly driving users to evaluate dial-up alternatives as part of their internetworking solutions," Helfrich said.

Our bridges connect what no other bridges can.



Network managers are always getting caught in the middle. On one hand, network users want data on demand without network delays and bottlenecks. On the other, management wants to keep down their costs.

Fortunately, there's a solution. The Microcom LAN Bridge™ (MLB™). A highly flexible bridging solution that transparently links either Token Ring or Ethernet networks. The MLB provides high performance remote, local, or combination bridge configurations on a truly plug and play basis.

Microcom's LAN Bridge also provides 4:1 data compression to move LAN packets even faster. That saves time and line costs whether you use leased lines at rates up to 2.048M or an X.25 network.

What's more, Microcom's LAN Bridge is modular for easy expansion. That means your investment is protected as your network grows.

So why get stuck in the middle? Choose a Microcom LAN Bridge.

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Worth Noting

AT&T has implemented Real-Time Network Routing, a new call routing system that enables each of its 114 4ESS switches to send calls via any other 4ESS switch. Previously, AT&T 4ESS switches could only search for a maximum of 20 alternative paths if the primary path was down.

Carrier Watch

AT&T last week announced a four-year multimillion-dollar contract with Tandy Corp. to build a Software-Defined Network (SDN) serving more than 7,000 locations worldwide.

The Fort Worth, Texas, electronics retailer will use SDN's Software-Defined Data Network data option to support a videoconferencing system that is expected to reduce the company's travel costs.

George Berger, Tandy's vice-president of human resources, said, "The AT&T SDN will consolidate thousands of long-distance phone bills submitted monthly from Tandy locations into less than 10 bills."

Metropolitan Fiber Systems of Chicago, Inc. (MFS) recently announced it has begun providing fiber-based alternative access services to tenants of the 3.7 million-sq-ft Sears Tower in Chicago.

Due to the large number of communications-intensive tenants expected to use MFS services from the Sears Tower, the alternate access service provider will locate two points of presence in the building.

MFS operates a 1,286-fiber-mile network that serves 48 buildings within the Chicago loop. The company provides fiber-based local access and private-line services.

FCC encouraged to advance switched access competition

Would let alternative carriers compete on new front.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — User groups and long-distance carriers last week urged the Federal Communications Commission to expand its efforts to foster competition for interstate access services in the local loop.

In May, the FCC proposed a new set of rules that would open virtually all private-line, or special access, services to competition. In comments last week, users and carriers strongly supported that change and urged the agency to take the next step and allow similar competition for switched services.

Alternative access carriers are currently limited to serving customers in buildings connected to their fiber networks and typically only provide private-line services to link user sites or to connect users to their long-distance carriers.

If the FCC follows through on its May proposal, alternative access carriers will be allowed to collocate transmission equipment in major local carriers' central offices and thereby pick up customer traffic in given local access and transport areas by using the Bell operating companies' private lines.

Although the FCC has not yet issued a proposal on switched access services, it is considering allowing competition there as well. By providing switched access, rival carriers would be able to compete for virtually all customers, not just high-capacity business lines, as is now the case.

A wider impact

The question of competition for switched access is more controversial for the agency, however, because it involves a much wider range of users, including small business and residential customers. Since about one-third of all local carrier revenue is derived from access services, the FCC wants to move slowly in order to avoid major price swings or other disruptions.

But users last week downplayed any possible problems and urged the FCC to open the door for switched access competition as soon as possible.

"The benefits of competition in the switched transport context are no less compelling than they are in the special access environment," stated the Ad Hoc Telecommunications Users Committee in an FCC filing. "The ad hoc committee urges the com-

(continued on page 14)

WASHINGTON UPDATE

BY ANITA TAFF

US West asks FCC to consider its CCS7 rates. US West, Inc. last week told the Federal Communications Commission that it is ready to start providing Common Channel Signaling services and asked for permission to establish rates for the offering.

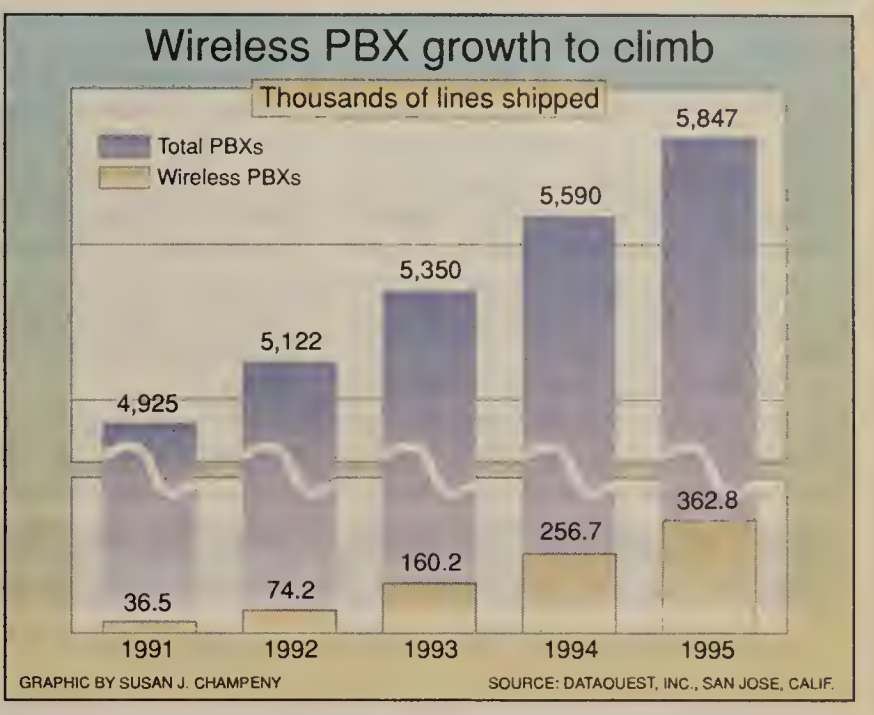
The carrier said it will charge for the signaling services on a two-part basis: a flat monthly fee to recover costs of the signaling transfer point and a per-call charge to cover costs of hardware and software in the central office used to handle the call.

Of the regional Bell holding companies that have moved toward offering Common Channel Signaling System 7 (CCS7) services under tariff, only Bell Atlantic Corp. and BellSouth Corp. have received FCC tariff approval. Nynex Corp. and Pacific Telesis Group are awaiting approval. Neither Ameritech nor Southwestern Bell Corp. have filed tariffs.

One reason for the uneven treatment of CCS7 by the RBHCs is that the FCC has not clarified exactly how rates of the new offering should be structured.

The agency and carriers are trying to determine for the first time how to tariff a service that helps deliver calls, instead of tariffing the calls themselves.

BellSouth and Bell Atlantic's tariffs offer CCS7 service as an option under Feature Group D and recover the cost of CCS7 facilities through Feature Group D charges.



Wireless PBX mart gets off to slow start

Misconceptions, size of current vendors slows acceptance, but the big players will give boost.

By Bob Wallace
Senior Editor

Vendors of wireless telephone systems must educate users about the technology and help them cost-justify products if the market is to thrive, industry analysts say.

However, that undertaking could be a tall task for wireless firms, which are typically start-ups with limited financial resources and little, if any, brand recognition.

"The gating factor in the acceptance of wireless [communications systems] is user education," said Greg Carlsted, telecommunications group director for Dataquest, Inc., a San Jose, Calif., consultancy. "And I don't think the vendors out there now have the resources needed to go it alone."

Several leading switch vendors, however, are expected to soon jump into the foray.

Whether the start-ups forge ahead by themselves or enlist the help of private branch exchange vendors, eliminating widespread misconceptions concerning wireless phone systems will be difficult.

One of the myths about wireless phone systems is that they all require a license from the Federal Communications Commission in order to operate.

Although this is true for some wireless systems, others use frequency bands preapproved by the FCC. A case in point is SpectraLink Corp., a Boulder, Colo., start-up that has developed the SpectraLink 2000 Pocket Communications System — a wireless system capable of supporting 2,000 lines and 400 simultaneous phone calls.

The system uses spread-spectrum radio technology and frequencies in the 902- to 928-MHz range. This technology distributes transmissions over a wide-frequency band and then gathers them back together at the point of reception.

Another common misconception is that large wireless phone systems are only designed to replace existing PBXs. Although some switch vendors plan replacements, systems such as SpectraLink's are designed to augment existing switches.

> One of the common myths about wireless phone systems is that they all require a license.
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New blood

Regardless of the approach, Carlsted said today's wireless vendors cannot legitimize wireless products on their own.

"The wireless industry, which is essentially a bunch of start-ups, needs one or more of the leading PBX vendors to enter the market to legitimize it," Carlsted said. "The industry needs some big name players with deep pockets to draw attention to the wireless market."

(continued on page 14)

Wireless PBX market gets off to slow start

continued from page 13

According to analysts, several major vendors are planning to enter the wireless market in coming months.

"If you ask most any [switch] vendor if they're working on wireless products, they'll say yes," said Robert Rosenberg, president of The Insight Research Corp., a Parsippany, N.J., research company. "They're planning new wireless phones for their existing switches or low-end wireless switches, such as key [telephone] systems."

A Northern Telecom, Inc. spokesman said the company is developing wireless systems that serve as adjuncts for its key systems, PBXs and central office switches but declined to say when the new products would be rolled out.

Steve Sivitz, wireless systems program manager for Rolm Systems, said the company will begin evaluating technologies for wireless PBXs in its laboratories next month. The firms aims to develop products that use the 900-MHz band, which does not require an FCC license, and have them available in the second half of 1992, pending successful testing at Rolm Systems facilities.

Although wireless products are useful to some users, Alan Sulkin, president of TeqConsult, a Fort Lee, N.J., consultancy, said he believes that wireless phone systems are not for everyone.

"I'd predict that where a company installs a wireless [telephone system], only about 6% of the employees will actually use it," he said. "Most of the users will be upper management."

SpectraLink predicts that, on average, 15% of a company's employees would benefit from the use of portable office telephones and that a typical user would spend 27 minutes a day on his pocket phone.

"Wireless could take off in niche markets, such as health care, and with companies that have campus-style environments," Sulkin said. "But I don't see these products being widely used in several different vertical industries."

Dataquest's market research shows an expected steady increase in wireless shipments — measured in line equivalents — until 1995. Also, the company predicts shipments of wireless lines will rise from 36,500 lines this year to 362,800 by 1995 (see graphic, page 13).

If users believe wireless telephone systems will be the same price or cheaper than PBXs, they are mistaken, according to analysts.

"The cost of a digital PBX today ranges from $500 to $600 a line," Sulkin said. "Based on the figures I've seen, wireless switches cost $800 to $1,000 a line. Customers are going to want more than mobility for that price."

FCC urged to advance switched access

continued from page 13

mission to diligently pursue its inquiry regarding . . . provision of interstate switched access transport service."

Electronic Data Systems Corp. (EDS) also strongly supported greater competition for both special and switched access serivces.

"From a user's perspective, increased competition should lead to improved [local exchange carrier] efficiency and service quality, and should encourage a more rapid deployment of new technology," EDS told the FCC. In addition, it should bring down prices.

> "From a user's perspective, increased competition should lead to improved service quality."
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EDS also urged the FCC to move quickly with its investigation of competition for switched access now that it appears the regional Bell holding companies will be allowed to enter information services.

"It is even more important than before for the commission to proceed promptly to create a more competitive local exchange market, given the [competing information service providers'] almost total dependence on RBHC facilities," EDS said.

Implementation concerns

The International Communications Association (ICA) also applauded the FCC's efforts to foster competition for both special and switched access services. But like EDS and the ad hoc committee, the ICA had concerns about the way in which the FCC plans to implement its new rules.

The commission has proposed letting the carriers decide whether to physically house rivals' equipment in their central offices or in nearby buildings with circuits running from the equipment to their switches, an arrangement known as virtual collocation.

According to the ICA, "Virtual collocation, while it can be workable, would provide a less effective technical means of interconnection and greater opportunities for strategic tariff manipulation by the [local carriers]."

DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

Astronauts on the recent Atlantis space shuttle flight tested a new electronic mail system that enables them to exchange data with National Aeronautics and Space Administration ground controllers. The setup would replace an existing facsimile net.

Data Packets

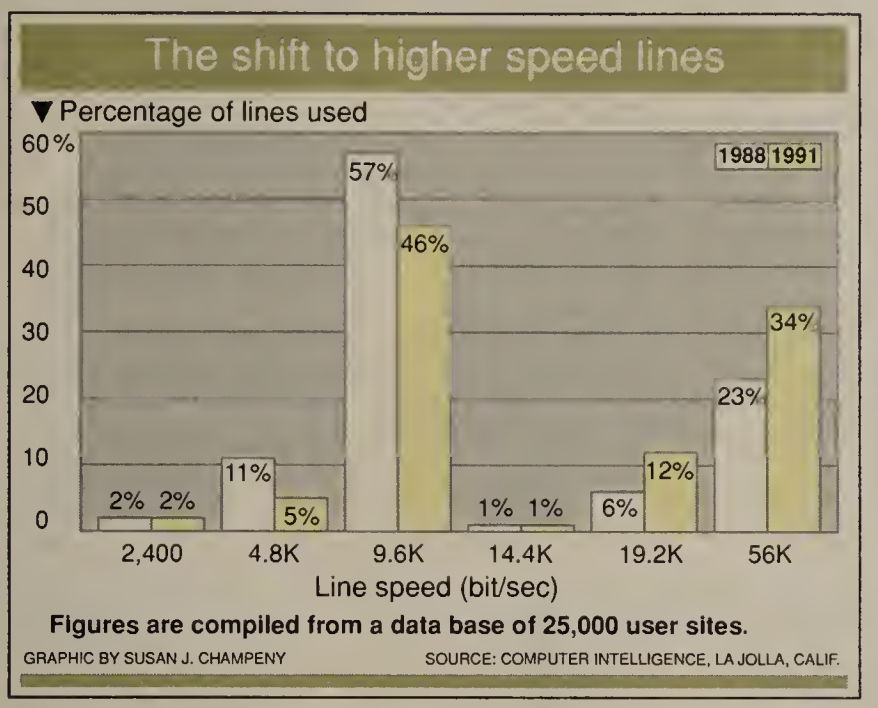
Enterprise Data, Inc. of Parsippany, N.J., last week announced Upstream, software that enables LAN-based or stand-alone personal computers to back up data to an IBM MVS mainframe via an LU 6.2 connection.

Upstream consists of two modules, one that resides on a workstation or server in the local-area network and the other that sits on the MVS mainframe. Together, they establish LU 6.2 Advanced Peer-to-Peer Communications sessions to exchange data with the mainframe.

LU 6.2 support enables users to employ higher transmission speeds than similar products based on IBM's LU 2 protocol.

Data can be stored to the MVS mainframe on-line for ready access or archived to disk for longer term storage. Upsteam PC/LAN, the module that resides on a LAN, requires an IBM Personal Computer with at least 512K bytes of memory, 1M byte of disk space, DOS 3.0 or higher and APPC. Upstream MVS, which resides on the host, requires a host running MVS/XA, IBM's Data Facility Product Version 2, Release 4 or later, ACF/VTAM Version 3, Release 2 and ACF/NCP Version 4, Release 2 or later.

Prices for the mainframe software range from $17,500 to $45,750, depending upon the IBM processor group. The LAN server software costs $1,980.



Software utilizes DDE to support application links

Builds ties between applications on PCs, hosts.

BOSTON — Wonderware Software Development Corp. last week announced a line of products that uses Microsoft Corp.'s Windows Dynamic Data Exchange (DDE) protocol to support network links between applications in different operating system environments.

NetDDE will ultimately make it possible to establish links between applications running on IBM Personal Computers under Windows or OS/2, Hewlett-Packard Co. HP 9000 minicomputers running HP-UX, the company's version of Unix, and Digital Equipment Corp. VAX minicomputers running VMS or Unix.

Networks supported include the Transmission Control Protocol/Internet Protocol, Network Basic I/O System-based nets and DEC's DECnet.

The product can also support serial communications links to remote hosts.

> The product can also support serial communications links to remote hosts.
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By comparison, the DDE protocol is typically limited to the exchange of data between applications running on a single machine under Windows.

According to Wonderware, NetDDE opens up a range of possibilities for using Windows applications as front ends for servers operating in VAX/VMS, Unix, OS/2 and other environments.

NetDDE for Windows and OS/2 are already available, but the Unix and VAX/VMS versions are still in final test and will not be released until next month.

The NetDDE product line includes a software development

> NetDDE opens up a range of possibilities for using Windows applications.
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kit (NetDDE SDK) for VAX/VMS and Unix that will help customers add DDE functionality to applications in these environments.

Two companions

The Windows and OS/2 versions of NetDDE will come with two companion programs designed to ease the use and utility of NetDDE.

One is NetClip, a clipboard facility that will enable cut/copy and paste/paste link functions between Windows, OS/2 applications or both running on different nodes in a net, the company said.

The second program, NetFile, is a utility that supports the transfer of files between network nodes using NetDDE.

NetDDE for Windows or OS/2 costs $149 per node, while NetDDE for VAX/VMS, Unix and HP-UX costs $2,000 per node. The NetDDE SDK kit is priced at $10,000.

Hub exec envisions gear as data switch

Chipcom CEO sees smart hub evolving to device capable of switching among local, remote nets.

Q&A

The market for intelligent wiring hubs that interconnect local-area network segments in a building or on a campus is booming. The intelligent or smart hub market is projected to total $377 million this year and double by 1994.

Based in Southborough, Mass., Chipcom Corp. is an intelligent hub manufacturer that has nearly tripled its sales from $10 million in 1988 to $28 million last year.

In an interview with *Network World* Staff Writer Maureen Molloy, Robert Held, president and chief executive officer of Chipcom, said smart hubs are evolving into electronic switches capable of connecting thousands of users across an enterprisewide net instead of just a few dozen in a departmental work group.

Where do you see the intelligent hub market heading?

We believe the market has changed from being oriented around the work group to a work group oriented around a whole facility or enterprise. And the reason for that change is network computing. Users are deploying applications that require data from across the enterprise, not just from a local server.

When you change from a work group or PC LAN to a facility or

(continued on page 16)

Robert Held

Octocom device provides dial backup for data lines

WILMINGTON, Mass. — Octocom Systems, Inc. last week unveiled a device which automatically initiates a dial-up link over the public network in the event a dedicated data line fails.

The company's OSI 7164 is a stand-alone device that sits between a customer's data terminal equipment (DTE) and a data service unit (DSU), monitoring line conditions and providing analog backup in case of a line failure.

Should a line fail or become saturated with interference, the OSI 7164 instructs an attached modem to establish a dial-up link to the destination site. Dial-up speeds of up to 14.4K bit/sec are supported. Once digital service has been restored, the OSI 7164 terminates the switched session and reverts to digital transmission mode.

Roger Walton, Octocom's director of marketing, said the product is especially attractive to banks, insurance companies and other business that use dedicated lines from branch or remote offices to feed information or provide on-line data base access to a data center.

"Anyone with a branch office network is a customer for the 7164," he said.

The OSI 7164 is a self-contained unit with three ports, two V.35 or RS-422 connections attached to a channel service unit on one end and to DTE at the customer premises end. A V.24 port is used to link the OSI 7164 to an Octocom modem or third-party equipment.

The device supports DSU connections ranging from 2,400 to 72K bit/sec on the digital services side.

The OSI 7164 monitors five digital service attributes: TX-Clock (transmit clock), RX-Clock (receive clock), RX-Data (receive data), DCD (data carrier detect) and DSR (data set ready). If the OSI 7164 loses readings on any of these attributes for a user-configured interval, the device works with an attached modem to initiate dial backup procedures.

The OSI 7164 is available now and costs $995.

Hub exec envisions gear as data switch

continued from page 15

enterprisewide LAN setup, very different technology is needed. A facility LAN is probably 100 times larger than a work group LAN. Three thousand, four thousand or five thousand users could be supported on a facility net. There is a whole new set of issues and a whole new ball game in terms of money and installation time frames. Facility LANs take about three years to put in and 10 years to get back the investment. It's like putting in a big telephone exchange rather than a PC LAN.

Every time a department or user is moved, the net has to be flexible enough to accommodate that change. And unlike PC LANs of today, which support data backup at night or on the weekend, facility LANs have to backup data on the fly because critical traffic is running on the net. The network itself becomes critical, not the computers on it.

Where does the smart hub fit into this facility network?

A smart hub is required to tie the various components of the facility network together. The smart hub will change over the course of the next few years because it's turned out to be a very convenient way to package a large group of network links.

Users are seeing more functions, such as bridging and routing, flowing into the smart hub. There's a tremendous race among vendors to add more and more value to the hub.

Do you agree with the assessment by many industry analysts that smart hubs will soon become a commodity market?

Not really. I see this as a minimum 10-year marketplace before things really begin to top out. Naturally, the rate of growth will slow as we go through the classic industry cycle from the embryonic stage to the mature stage.

The mature stage will probably come toward the end of the decade, but between now and then, there's going to be a tremendous technology growth phase.

Right now, the market is growing so quickly there's plenty of room for everyone, but I see a shakeout coming over the next three to five years where the smaller firms or those who entered the market too late will get swallowed up. In the end, the smart hub will become the center of literally everything that happens in the network.

Who do you consider your prime competitors in this market?

I view any smart hub maker as a competitor, but the two we run up against most when vying for large accounts are Cabletron [Systems, Inc.] and Synoptics [Communications, Inc.].

It's obvious that all the large mainstream players like IBM and AT&T, who are currently sitting on the sidelines, will also be our competitors soon. This is just too big and too attractive a market for them to ignore, and it'll be our job to plan a strategy that will allow us to wind our way through this eventual mine field.

How do you differentiate yourself from your competitors?

From the beginning, we've focused on a specific market, which is the user with a very large enterprisewide network. The result is a product architecture that is aimed at solving the problems of network computing. This differs from other architectures that are targeted at solving the work group problem.

Net computing is no longer a function of tying 40 nodes together but of tying together enterprisewide systems involving 4,000 to 5,000 nodes. Our strategy is to give the user the ability to change between LANs on the fly electronically, rather than having to move cables like users must with other smart wiring hubs. Instead of just being a connection point for LAN segments, the smart hub becomes an electronic switch. Essentially, that's what our Tri-Channel Architecture gives you.

We also differentiate ourselves by our heavy emphasis on fault-tolerant networking, which our ONline Concentrator achieves via redundant power supplies, cable links and system boards. This becomes important when you consider network reliability is key for users migrating their mission-critical applications from mainframes to client/server environments.

What steps are you taking to sustain growth and make a bigger push into the intelligent hub market?

We introduced token-ring support into our ONline Concentrator last spring, which we see as significant to our future growth.

The market for 10Base-T Ethernet hubs is large and growing but is becoming a commodity at the low end. Token ring, on the other hand, represents a very large market opportunity.

Token ring has been slower to develop than Ethernet because it's a smaller market. But more important is that a large segment of the token-ring market is committed to IBM, and IBM has yet to commit itself to any kind of smart hub solution.

It's difficult to gauge how the token-ring market is going to shake out. If it moves as quickly as the Ethernet market moved from stand-alone boxes to integrated hubs, then it'll be a very good market for us.

During the past year, we've been shipping a full line of Ethernet capabilities. Next in store is to roll out an almost identical strategy for FDDI.

Why have two gateways when you can accomplish everything you want with just one?

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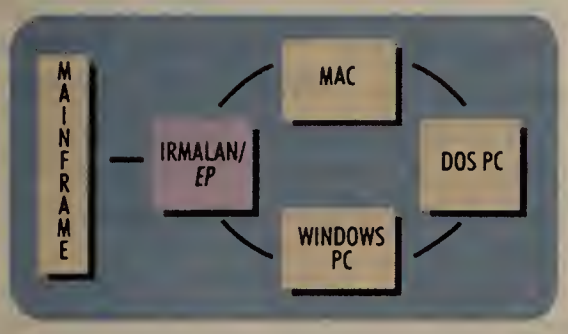
As the mainframe connectivity expert, DCA® has now pioneered new ground with the introduction of our enhanced 3270 gateway, IRMALAN™ for Extended Platforms (*EP*).

With our proven expertise in both PC (IRMALAN) and Macintosh® (MacIRMALAN™) gateway support, in addition to Windows™ 3270 connectivity (IRMA™ WorkStation for Windows), we've developed IRMALAN/*EP* as the single superior gateway solution.



With IRMALAN/EP 3270 gateway, you can support DOS, Mac and Windows clients with a single gateway.

With this single gateway, you can now support DOS, Mac and Windows clients. And it's also designed for IBM® NETBIOS, Novell®'s IPX/SPX protocol* and AppleTalk®.

And by supporting multiple platforms on your LAN, IRMALAN/*EP* eliminates the need to purchase more than one gateway. That's a cost savings that puts it far above anything offered by the competition.

But that's not all. IRMALAN/*EP* comes with RamXpander,™ our memory manager that allows fully featured emulation in less than 40K of resident memory.

Plus, our unique server licensing also makes it one of the most cost-effective gateways available. That's because we base the price on how many users on the LAN need to access the mainframe at once. So you only pay for the access you need, choosing from 8, 32, 64, or 128 concurrent users.

We've even made it easy to purchase IRMALAN/*EP* by including DFT, SDLC and 802.2 token-ring gateway software under NETBIOS, NetWare® and AppleTalk all in one package. So now, migrating to different gateway technologies won't cost a thing.

To get you up and running, the DOS client is also included. To extend your platforms, just add software for Macintosh and Windows users depending on your needs.

So now that there's only one gateway decision, just call DCA at 1-800-348-DCA-1, ext. 70R, to receive free information with further details on connecting your mixed LAN environments to the mainframe.

Or better yet, just call your reseller to order IRMALAN/*EP* today. Because with our new single gateway solution, now there's no need for you to even think twice.

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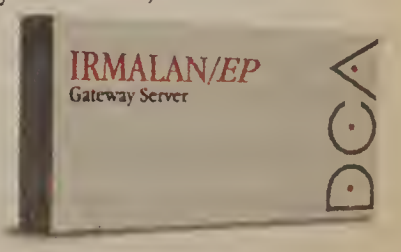

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S. Robert Levine
President & CEO

Ethernet, Token Ring and FDDI

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Cabletron's Multi Media Access Center intelligent wiring hub series connects Ethernet, Token Ring and FDDI local and wide area networks together in a single chassis. Our other hub products include standalone devices for 10BASE-T and Token Ring smaller connectivity environments.

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And now we've brought network management to a new level with SPECTRUM,™ Cabletron's advanced management platform, that goes far beyond the current generation of management systems to provide a cohesive, powerful and flexible environment for managing multivendor networks.

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The Complete Networking Solution

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It is easy to see why Cabletron has become the leader in network management technologies. That's why over 22,000 customer sites already use our products to connect more than 2 million network nodes. Use Cabletron's network management team to give your company the competitive edge it needs.

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Worth Noting

"LAN Manager 2.1 will be more self-tuning than previous versions. It will do its own intelligent defaults. For example, if you're transferring small files, it will allocate the appropriate buffers to deal with them. And if file sizes grow, it will reallocate the buffers accordingly."

Rich Barth
LAN Manager product manager
Microsoft Corp.
Redmond, Wash.

Netnotes

Trellis, based in Princeton, N.J., recently unveiled the Trellis Expose network manager, a Microsoft Corp. Windows-based network management system for Banyan Systems, Inc. VINES networks.

Some of the features of Expose are automatic mapping of network topology, delivery of alarms through electronic mail messages or phone paging, multiple network views and continuous collection of performance statistics.

Expose is a client/server application. One client software license allows users to display the topology and statistics for an unlimited number of servers. It is available now for $2,995.

Companion server licenses provide graphing and full alarm capabilities and are available in various configurations. A single unit costs $1,250 per server, a five-server license is $5,950, a 10-server license is $11,250, and a 25-server license is $26,550.

Cisco Systems, Inc. has rolled out a single-board module for Cabletron Systems, Inc.'s MultiMedia Access Center intelligent hub that supports bridging, routing and gateway functions in internetworked environments.

(continued on page 20)

3Com offers inexpensive NetWare 10Base-T adapter

Restricting product use to Novell nets lowers price.

By Caryn Gillooly
Senior Editor

SANTA CLARA, Calif. — 3Com Corp. last week introduced its second network adapter designed specifically for use in Novell, Inc. NetWare local-area networks.

The product, called the NW1000-TP, is a 10Base-T-compliant Ethernet interface for IBM Personal Computers and Personal System/2s with Industry Standard Architecture (ISA) buses. The card supports 10M bit/sec transmission speeds over unshielded twisted-pair wire.

The NW1000-TP is the second in a family of NetWare-specific products that 3Com has unveiled. Last May, 3Com introduced the NW1000, an ISA Ethernet board that supports coaxial cable links.

According to Rakefet Kasdin, 10Base-T product manager at 3Com, based here, the NetWare-specific products cost less than the company's EtherLink family of adapters because those products come bundled with drivers for a range of different network operating systems. The new boards simply come with NetWare drivers.

The NW1000-TP card costs $299, while the equivalent EtherLink 10Base-T card costs $345, Kasdin said. She added that a pack of five NW1000-TP cards costs only $1,295 — $259 per card — while the EtherLink five-pack costs $275 per card.

The lower price boards, when used with the firm's recently announced MultiConnect 10Base-T hub starter kit, will enable NetWare users with as few as three or four nodes to install hub-based, star-wired 10Base-T networks.

According to Kasdin, hub-type networks are easier to manage than conventional bus nets because all the traffic travels through the hub. However, many customers with smaller networks have been shut out of the hub option because of the high cost of 10Base-T adapters. Ironically, these customers are often the ones that can least afford an in-house administrator; therefore, they would benefit most from the management benefits associated with hubbed nets.

Besides the MultiConnect hub, the NW1000-TP can be used with the rest of 3Com's 10Base-T line of products. "Nobody else we know of offers an entire [10Base-T] solution," Kasdin said.

(continued on page 20)

HRMS software supports range of new data bases

By Timothy O'Brien
West Coast Bureau Chief

WALNUT CREEK, Calif. — PeopleSoft, Inc. recently announced new versions of its PS/HRMS human resource management software for use with Microsoft Corp.'s SQL Server, Hewlett-Packard Co.'s ALLBASE/SQL and Oracle Corp.'s Oracle Server data base management system running on HP's HPUX.

The new products build on PeopleSoft's strategy of providing client/server human resource management software that supports multiple relational data bases.

"Users should be able to make decisions about applications independent of the data base environment that is being used," said Linda Zecher, PeopleSoft's vice-president of marketing.

Two versions of PS/HRMS, a fully integrated human resource, payroll and benefits system that has been available since 1989, are available for use with GUPTA Technologies, Inc. SQLBase for OS/2 and IBM's DB2 for MVS.

Based on a client/server model, the PS/HRMS applications run on workstations under Microsoft's Windows and uses SQL to communicate with server data bases. Each version takes into account the different data base interfaces and the translation from DOS-based Windows to the server's operating system.

PS/HRMS was designed using PeopleTools, PeopleSoft's own application development environment. Customers can also use the tools to customize and maintain their PS/HRMS system without changing source code.

In addition, other front-end tools that support the target data bases, such as GUPTA's Quest product, can be used to generate reports from PS/HRMS data stored in the SQL data bases.

According to Zecher, most human resource management software systems used by Fortune

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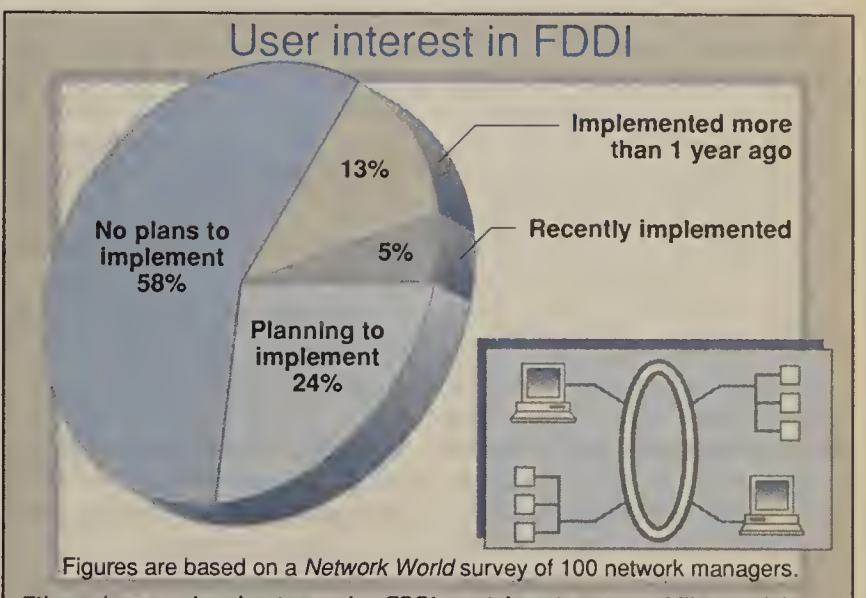

Figures are based on a *Network World* survey of 100 network managers.

Ethernet users planning to employ FDDI can take advantage of fiber optic's benefits today by using a proposed IEEE backbone standard called 10Base-FB, which specifies the same fiber-optic cabling as the FDDI standard.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: *NETWORK WORLD*

Standard for fiber Ethernet advances

10Base-F details variety of uses for fiber in Ethernet, including way to provide a stepping-stone to FDDI.

By Salvatore Salamone
Features Writer

KAUAI, Hawaii — An IEEE standard that would spell out requirements for supporting Ethernet over optical fiber and provide a stepping-stone to FDDI inched closer to reality when it moved to letter ballot at a recent meeting here.

The standard, dubbed 10Base-F, which is currently being developed by a working group within the IEEE's 802.3 group, specifies several configurations in which fiber optics can be used with Ethernet local-area networks.

One part of the 10Base-F standard specifies how fiber can be used to build a star-configured Ethernet based on either a passive or active hub. The active hub portion of the standard is similar to the specifications used to define 10Base-T active hub networks.

Another section of the standard, an updated version of the fiber-optic interrepeater link standard, spells out how to use fiber for point-to-point links between Ethernet LANs over distances up to 2 km, while another section addresses how to use optical fiber in an Ethernet backbone.

The latter section may be the most interesting for net managers since many Ethernet users predict that increasing traffic loads will ultimately require a migration to higher speed networks, such as Fiber Distributed Data Interface.

Indeed, a recent *Network World* survey of 100 network managers found that about a quarter of the respondents are planning to implement FDDI (see chart, this page).

While few companies need FDDI nets today, the 10Base-F standard would make it possible for users that need to install or extend networks to lay fiber to meet today's Ethernet needs and accommodate future use of FDDI.

The 10Base-F backbone standard, dubbed 10Base-FB for fiber backbone, calls for the same type of fiber as the FDDI standard. For example, it has the same core and outer diameter. Additionally, the maximum distance specified in 10Base-FB is 2 km, the same as the distance specified in the FDDI standard.

> The standard would make it possible for users to meet today's Ethernet needs and accommodate future use of FDDI.
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The final stretch

This stepping-stone approach to FDDI was appealing to members of the 10Base-F working group. However, as the 10Base-F standard was being developed, there was no consensus among the working group's members on its format. That has changed, though.

"We now have a broad base of

(continued on page 20)

Netnotes

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Called the Cisco Router Module (CRM), the product, like other Cisco routers, offers routing support for 16 communications protocols. It also includes a software-based protocol translation feature that allows communications between devices running the Transmission Control Protocol/Internet Protocol, X.25 and Digital Equipment Corp.'s Local Area Transport protocol.

According to Cisco, based in Menlo Park, Calif., the CRM comes in two versions: a local version with two Ethernet ports that connect two adjacent Ethernet local-area networks or divides an Ethernet backbone into segments; and a remote version with one Ethernet port and one high-speed serial port.

The CRM has a filter rate of 19K packet/sec and a forwarding rate of up to 6K packet/sec. Available now, CRM costs $5,495 for the local version and $5,995 for the remote version. The gateway software costs $1,350.

Insignia Solutions, Inc. recently introduced SoftNode, broadening the personal computer-emulation capabilities of its SoftPC product to run in a networked environment.

SoftPC lets Apple Computer, Inc. Macintosh users emulate IBM Personal Computers, enabling them to run personal computer applications using a window on the Macintosh. SoftNode lets these Macintoshes exist and participate in Novell, Inc. NetWare local-area networks.

According to Ivor Share, vice-president of sales and marketing at Mountain View, Calif.-based Insignia, many other products that allow Macintoshes to be peers in a LAN are server-based, while SoftNode resides on each individual Macintosh.

SoftNode is expected to be available next month for $175. A 10-user license will cost $1,150.

Retix, based in Santa Monica, Calif., has added the 4760 Local Bridge/Router to its line of internetworking products.

Based on the company's existing 4660 Local Bridge, the new product can simultaneously route Transmission Control Protocol/Internet Protocol traffic while bridging the traffic of other protocols.

The 4760's routing capabilities let administrators partition their net by IP address either for scaling down larger networks or for simplifying security and gaining more traffic control. For all other protocols, the 4760 retains the features of the Retix 4660 Local Bridge, including support of the IEEE Spanning Tree Protocol.

The bridge/router has a forwarding speed of 7.8K packet/sec for routing and 13.65K packet/sec for bridging.

The 4760 Local Bridge/Router is priced at $4,250 and is available now. For existing 4660 Local Bridge customers, an upgrade package is available for $750.

Iselin, N.J.-based **Triton Technologies, Inc.** recently announced CO/Session ACS, a non-dedicated asynchronous communications server for use on local-area networks. Although bundled with modem sharing, remote control, file-transfer and terminal-emulation capabilities, the product is primarily designed to let network users share modems on a Novell, Inc. NetWare or Network Basic I/O System LAN without dedicating a personal computer as a communications server.

With the product, any modem on the network can be used by any user for dialing out or receiving incoming calls. According to the company, communications sessions will take place in the background of the IBM Personal Computer, XT, AT or Personal System/2 to which the modem is connected. The software takes up 9K bytes of memory on the machine supporting the modem and 6K bytes on the machines sharing the modems.

Expected to be available early next month, CO/Session ACS will come in two- and four-modem versions costing $295 and $590, respectively.

Eicon Technology Corp. of Montreal last week broadened its line of IBM 3270 terminal- and printer-emulation products with the addition of Access for OS/2.

The software will let an OS/2 workstation emulate a 3270 device and connect to an IBM host through either Eicon's SNA Gateway or Direct Token Ring connection products. Thus connected, the station can support as many as 32 simultaneous display and printer sessions.

Access for OS/2 supports IBM's Presentation Manager graphical user interface. Other products in the Access family are Access for Windows and Access for DOS. Access for OS/2 is expected to be available next month for $395.

Pack supports data bases

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1,000 companies today are mainframe-based, third-generation language applications or proprietary systems.

She said PeopleSoft is trying to leverage SQL to meet user requirements for open systems that will allow applications to be run across different platforms.

For instance, as more large companies become decentralized, it is possible with PS/HRMS to run payroll on a local-area network in regional offices and use the mainframe-based DB2 system as a central repository for all the company's employee data.

PeopleSoft has an annual revenue of about $8 million, which it hopes to double this year. HP, Microsoft and its codeveloper of SQL Server, Sybase, Inc., all use PS/HRMS internally.

PS/HRMS is expected to be available for SQL Server in December, for ALLBASE/SQL by mid-1992 and for Oracle Server by year-end 1992.

Prices for PS/HRMS range from $140,000 to $500,000, depending on the number of users and the hardware configuration. PeopleTools are also licensed as part of the system.

Standard for fiber advances

continued from page 19

support," said Yoseph Linde, a 10Base-F committee member and chairman of the board at Chipcom Corp. "The major companies [in the working group] have recently agreed to the current approach."

Others concur. "People are now fairly satisfied [with the current version of the 10Base-F standard]," said Patricia Thaler, chairwoman of the IEEE 802.3 committee and a principal engineer with Hewlett-Packard Co.

Support by the working group for the current version is strong.

> "There now seems to be a sense of urgency to complete the standard," Linde said.
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"There now seems to be a sense of urgency to complete the standard," Linde said.

At the July IEEE meeting, the 10Base-F working group voted to submit the draft of the standard to the full committee for letter balloting, a process in which committee members review the document and can respond with written comments.

Linde noted that the vote to go to the letter ballot stage was almost unanimous.

The draft of the standard will be mailed to committee members this month, according to Fred Scholl, chairman of the 10Base-F working group and president of New York-based Monarch Optical Research, Inc.

"If we don't get a lot of no votes, vendors will start building products," he said.

Network managers will be able to take advantage of these 10Base-F network options fairly soon after the standard is approved.

Many vendors are already gearing up to sell 10Base-F products. Manufacturers that currently sell equipment based on the 10Base-T standard for running Ethernet over twisted-pair wiring may, in fact, base their 10Base-F products on 10Base-T designs. This could involve the simple exchange of a 10Base-F transceiver for a 10Base-T transceiver on a network interface card.

Besides providing an answer for Ethernet customers who see FDDI in their future, where will users implement 10Base-F?

10Base-F networks could be appropriate in electrically noisy environments, such as manufacturing plants. Another application envisioned is in plants where electrical networks present a threat, such as in a paper plant where flammable paper dust floats in the air.

In both examples, users could install — and many have installed — proprietary fiber-optic networks. The 10Base-F approach simply offers a standards-based way to build a network.

3Com offers NetWare adapter

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According to Kasdin, 3Com does not plan to offer other environment-specific products, such as adapter cards for Microsoft Corp.'s LAN Manager or Banyan Systems, Inc.'s VINES. "NetWare is the obvious choice because of its installed base," she said.

The NW1000-TP is available now. Both NW1000 adapters ship with drivers for NetWare 2.x and 3.x. The NW1000 has received Novell certification for NetWare compatibility, while the NW-1000-TP is pending certification.

Worth Noting

"One thing we would do differently if we started over again is hold our suppliers' feet to the fire until they provided us with equipment that meets the specified standards."

Dave Skiven
Manager of facilities, systems and manufacturing integration
Saturn Corp.
Spring Hill, Tenn.

Association Watch

The **Society of Manufacturing Engineers (SME)** will hold its annual Autofact '91 conference and exposition from Nov. 10-14 at the McCormick Place East convention center in Chicago.

This year's event will consist of more than 200,000 square feet of demonstrations, innovative technologies in computer hardware, manufacturing applications software, and computer-aided design and manufacturing.

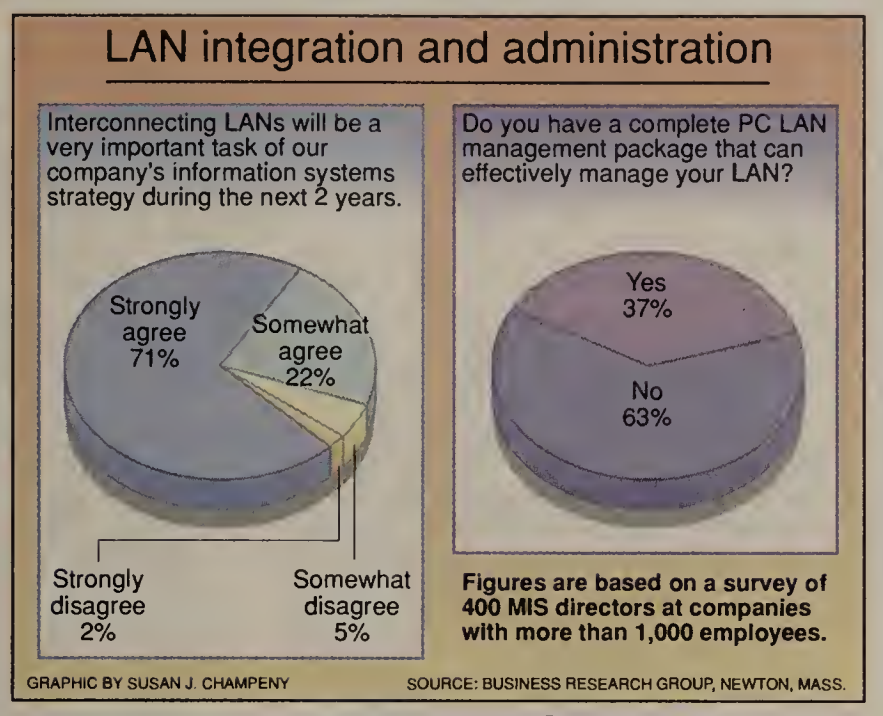
Tutorials, forums and seminars will also be held during the five-day meeting, including topics such as product design and process engineering.

For more information, contact Diana Campau or Carol Anderson at (313) 271-0777.

The **Corporation For Open Systems International** will hold the next meeting of the User Alliance for Open Systems on Nov. 20-21 at the Hyatt Regency Hotel in Reston, Va.

The meeting will be part of a week-long series of open systems conferences and tutorials beginning on Nov. 18. It will include a two-hour panel discussion in which seven of the information technology industry's top chief executive officers and chief operating officers will share their views on open systems.

For more information, contact Ed Albrigo at (703) 848-4572.



Users cite lack of products, skilled staff for LAN mgmt.

BRG study shows some firms eyeing outsourcing.

By Maureen Molloy
Staff Writer

NEWTON, Mass. — The increasing use of local-area networks has left MIS departments grappling with a myriad of integration and management headaches.

According to a user study by Business Research Group (BRG), a market research firm in Newton, Mass., the key LAN challenges facing MIS managers include insufficient LAN management products and a dearth of qualified staff to handle LAN administration.

> Survey participants noted that the challenges are not solely technical.
>
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The study stated that the lack of LAN security and management software is the primary reason why companies are not developing mission-critical applications on LANs more rapidly.

While more than 70% of managers surveyed said they are interested in moving toward integrating LANs into their enterprise nets, only 37% said they have adequate LAN-based management tools to aid in that migration.

The survey findings were based on interviews with more than 400 MIS directors who have LAN administration responsibilities and whose installations are in user sites of more than 1,000 employees.

The second key problem with LAN integration, users said, is lack of qualified staff. While 93% of the respondents agreed that internetworking is an important part of their information systems strategy, 35% pointed to insufficient expertise as their biggest obstacle to internetworking multivendor LANs.

Compared to the administration of earlier, relatively simple networks, the task of finding staff capable of designing, maintaining and integrating LANs is more formidable, respondents said.

Furthermore, servers have more power, support more clients and provide more functions, such as electronic mail, facsimile and host access. Client nodes now require automatic backup and more effective security. There is also an increasing need to manage personal computer-based software, adding complexity to the LAN administrator's job.

To help compensate for the lack of in-house expertise, 76% of the respondents will look to outside vendors for help in defining their LAN integration needs.

Human element

Survey participants further noted that the challenges are not solely technical. In many firms, LAN administrators are put in the delicate position of balancing the needs of the MIS department with those of the end-user community in issues such as company standards vs. freedom of choice and security vs. access to data.

The increasingly complex nature of the LAN administrator's job has led many MIS departments to institute formal training programs. The survey revealed that 64% of the respondents have

(continued on page 24)

Bank official reveals net merger lessons

Fleet/Norstar's Zucchini sites benefits of single approach when banks consolidate operations.

Q&A Michael Zucchini, chief information officer at Fleet/Norstar Financial Group in Providence, R.I., said establishing a common set of applications and a shared network is the key to consolidating computer systems when two banks merge.

He ought to know. Since coming to Fleet/Norstar, Zucchini, who has responsibility for data processing and back-office operations for Fleet/Norstar's eight banks and nonbank subsidiaries, has overseen a dozen consolidations.

Currently, Zucchini is orchestrating the monumental task of merging the Bank of New England Corp.'s systems, networks and back-office operations with Fleet/Norstar's.

The purchase of the Bank of New England, which occurred in April, makes Fleet/Norstar the 12th largest U.S. bank with more than 1,000 offices nationwide and $48 billion in assets.

Zucchini recently spoke with *Network World* Senior Editor Wayne Eckerson on the problems and challenges of melding the two bank's networks and operating systems.

How is the Bank of New England consolidation going?

Very well, although we are just starting the process. We estimate that the consolidation will save the bank $80 million to $90 million over an 18-month period. And those savings are just from consolidating back offices, data processing and network operations.

There are other ancillary functions that can be consolidated once you have common software. For example, if you use the same

(continued on page 26)

Michael Zucchini

GUIDELINES

BY ERIC SCHMALL

Benchmarks must be focused to be effective

"There are lies, damn lies and statistics," Mark Twain once said. Wise as his observation was, he obviously never had any experiences with computer network benchmarking exercises.

In terms of numerical sleight of hand, few things in the information age can compare with the distortions and silly conclusions that can be drawn from a shoddily run comparative study of networks. This is not to say that the concept of benchmarking is suspect per se. The very principle of taking a known, ideal pattern and using it as a model to measure and compare other like items forms the foundation of testing theory.

Such comparisons should yield objective results that help companies improve less-than-efficient processes.

The problem begins in practice, when people decide to benchmark the wrong things, ignore aspects they consider unmeasurable or force inane conclusions to fit. Sometimes the crudest benchmark exercises are the most dangerous because they are easily believed.

(continued on page 24)

Schmall is a network systems manager for an insurance holding company.

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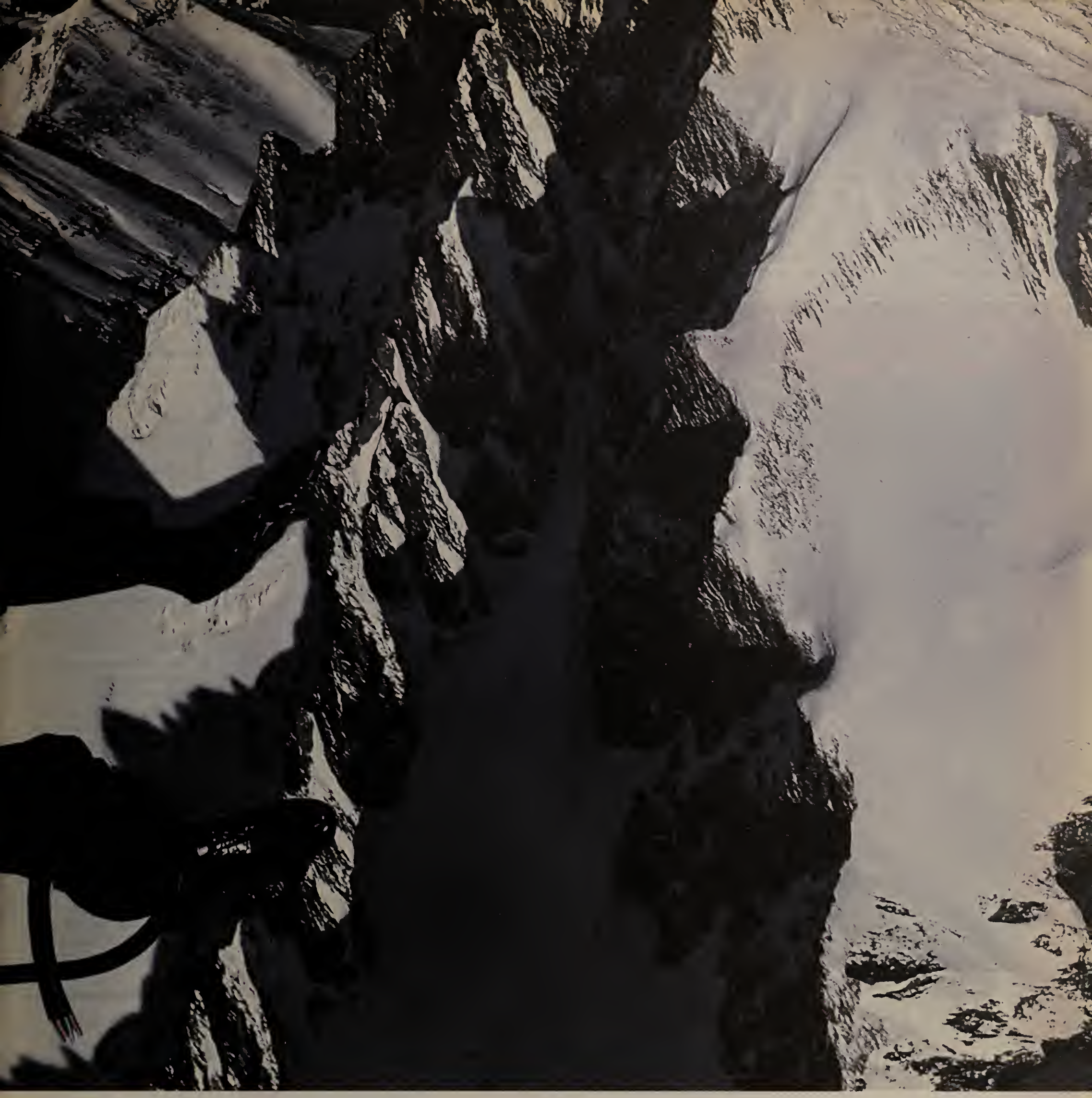

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Benchmarks must be focused

continued from page 21

For example, let's say I'm a network benchmark consultant. I take the total number of dollars you spend on data communications annually and divide that by the total number of employees that use the network. This will yield your per capita network cost. So if you're spending $1 million annually and you have 1,000 users, your per capita network cost is $1,000.

Now suppose I pull out my list of what I call ideally managed networks and find that firms of similar size generally spend only $500,000 annually. The ideal per capita ratio is $500. Yours is twice as costly. Try explaining that to your senior management.

It won't matter that your net is more sophisticated, delivers twice the information or lets your organization dominate its marketplace. Those are difficult to measure. The benchmark, that supposedly empirical, coldly rational assemblage of numbers and formulas, has demonstrated that your operation is spending twice the norm.

Now you have to be held accountable for your profligate spending. As your benchmark consultant, I can summon up even more terrifying statistics. I can divide the total number of bits transmitted by the total number of employees to come up with a data flow-per-person ratio in order to see how that figure compares with the industry norm. Never mind what it may mean.

I can also take the number of people in your network control room and divide that by the number of active ports on your front-end processor to grind out your person-per-port quotient. That statistic, along with a couple of comparative graphs, will suggest to management that you are profoundly overstaffed.

All this suffering can be avoided if the telecommunications manager has an opportunity to participate in the process of reviewing and selecting what will be measured, how it will be measured and for what reasons.

In fact, the telecommunications professional should be actively searching for ways in which his operation might be quantitatively compared to other networks. This means playing a pivotal role in deciding which benchmarking firm should be employed.

By examining a company's methodology and understanding what it measures, as well as why and how it interprets those results, a true reflection of reality can be derived from the exercise. And only then can logical conclusions spawn practical improvements that will truly make an important difference in network efficiency.

The benchmark has demonstrated that your operation is spending twice the norm.

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Users cite lack of skilled staff

continued from page 21

instituted such programs.

Participants added that the task of managing LANs has brought with it a renewed reliance on MIS in many companies. Nearly 80% of MIS managers surveyed said they provide administrative support or maintenance for LANs.

Respondents said the MIS department is developing the skills required for managing LAN equipment and information, and although these assets are now decentralized, their control is becoming more centralized.

The services that most MIS shops are providing are traditional MIS services including net maintenance and integration, capacity planning and help-desk support.

For further study information, contact the Business Research Group at (617) 964-6204.

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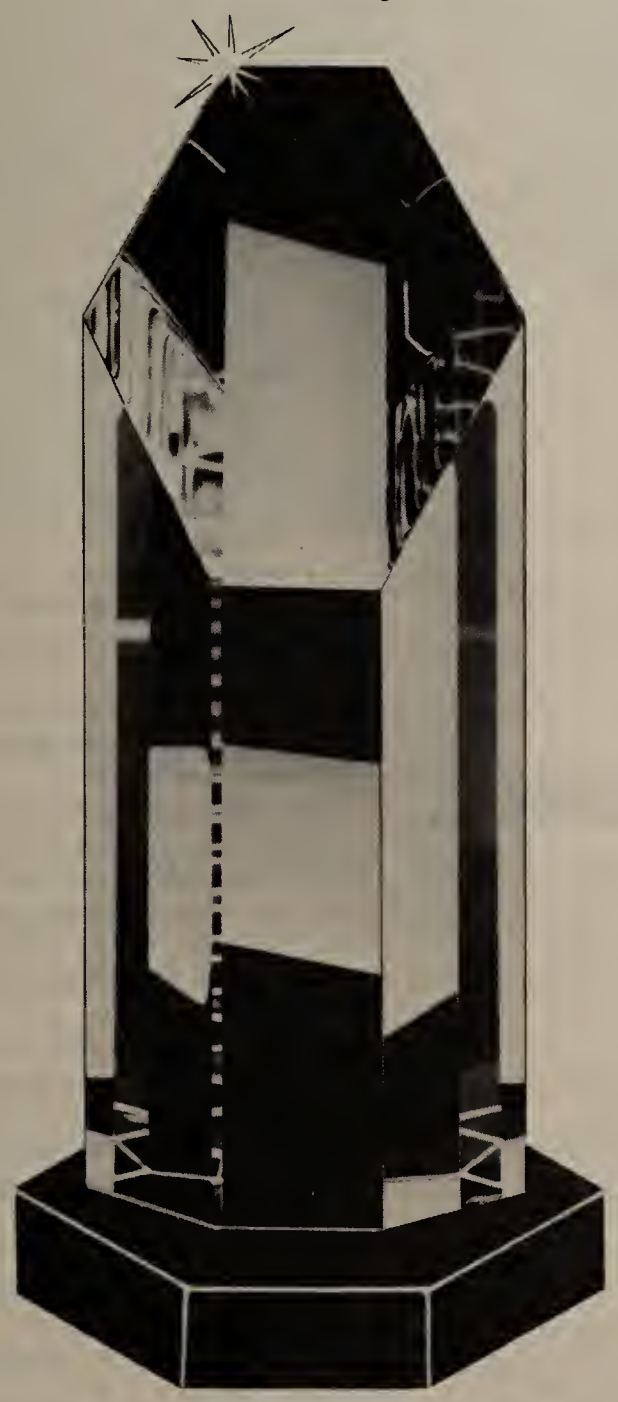

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Bank official reveals net merger lessons

continued from page 21

general ledger, you can can consolidate the comptroller's systems, payroll, accounts payable and gain additional savings.

Most banks are conservative in their use of technology, preferring not to be bleeding edge or leading edge users. Is this true of Fleet/Norstar?

Technology to us is a tool, and when appropriate, we use the tool. We don't take unnecessary risks. My job is to manage risk. We are aggressive in areas that we believe will provide significant payback. For example, we are one of the few banks working with IBM to develop an imaging system to expedite check processing.

We are also currently working with IBM to automate our network desk using expert systems. Much of what's done in the network room today is routine and predictable and can be automated. When it's not routine, expert systems can be used to facilitate the process.

The technicians on my staff understand that they have a tool bag, and if all they have is one tool, they are not going to be very useful to us. I want them to be familiar with every tool, whether it's client/server computing, distributed processing or COBOL.

How do you get your staff comfortable using a variety of tools?

We expose them to a variety of tools and explore which applications are best suited for employing these tools. You don't want to start putting buttons on people's lapels that say, 'I only do client/server.'

Do you have a strategy or formula for consolidating networks, systems and back offices after a merger or acquisition?

The foundation is establishing a common set of applications. Once you have common software, everything else falls into place. There are three major benefits that come from having common software: expense reductions, quality improvement and quicker deployment of new applications.

Without common software, you don't get much gain out of consolidating back offices or information systems because you still have different functions and procedures. Bank of New England, for example, runs all its Massachusetts and Connecticut banks out of a single data center, but they are supported by completely different computer systems. That minimizes economies-of-scale savings.

How does common software improve quality and speed the development of new applications?

With common software, for example, a bank can run one deposit system instead of seven, which was the case with Bank of New England. This means that when there is a problem at three o'clock in the morning, the [systems] operator knows exactly what recovery procedure to implement. With seven different deposit systems, the operator has to spend a lot of time figuring out which recovery procedure to use for which system and bank. With common software, the operator can learn the recovery process better and the bank can invest more time and money in improving the procedures.

Common software speeds up application development because when we write a line of code, it works for every one of our banks.

For example, the bank just issued a new debit card. Once we tested it at one bank and made sure it worked and the customers liked it, we could roll it out at all our banks simultaneously. With common software, each bank doesn't have to develop separate programs to support the product or service.

How difficult is it to develop common software?

It's not hard. While we have sophisticated systems, many of our underlying applications are off-the-shelf. We spend most of our time integrating these applications. We write software that sits above the applications and extracts information from them.

This information is then put into our Fleet One bank statement. The statements include information about multiple checking and saving accounts, certificates of deposits, individual retirement accounts, consumer loans, first and second mortgages, credit card bills and equity transactions, all on one monthly statement. In other words, any business you do with us will show up on that statement.

We didn't write our deposit and loan systems, but we wrote the software that interfaces with those standard systems and creates the Fleet One statement. And we do that with a number of other products.

In a merger, how do you decide which bank's software to use?

The job of picking software should be easier, but it is often politically charged. People have a lot of pride in the applications they develop and don't want to see them discarded.

Since Fleet/Norstar recently implemented all new software, we have designated these as the target systems. That means all Bank of New England applications will no longer be used, except for a few clearly superior applications.

Why do banks seem to have em-

(continued on page 60)

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INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

World News

World Communications, Inc. (WorldCom) recently said it has received the green light from the Federal Communications Commission to expand its international switched voice and data services to 77 additional countries, including the Soviet Union, the People's Republic of China and Eastern Bloc countries.

A WorldCom spokesman said there is no timetable for service availability in the different countries because the carrier must first work out agreements with local post, telegraph and telephone administrations.

AT&T recently acquired Hutchison Inet, a Hong Kong value-added network services provider, and formed **Hutchison AT&T Network Services (HANS)** to provide value-added services in the region.

Under the joint venture agreement, HANS is the exclusive AT&T Easylink services provider in China, Hong Kong and Macao.

The agreement will enable HANS to compete against Hong Kong Telecom, which provides a similar variety of services.

HANS is 51% owned by Hutchison Telecommunications, Ltd. and 49% held by AT&T Hong Kong. The deal will enable HANS to market Easylink messaging services — enhanced facsimile, AT&T Mail and electronic data interchange services — in Hong Kong outside of Hong Kong Telecom channels.

New Zealand's carrier lays out ISDN tariff structure

Usage, installation rates set for BRI, PRI services.

By Amanda McVitty
IDG News Service

WELLINGTON, New Zealand — Users in need of Integrated Services Digital Networks can start planning in earnest as a result of Telecom New Zealand's long-awaited tariff announcement.

The carrier recently detailed rates for both Basic Rate Interface (BRI) and Primary Rate Interface (PRI) services. Although the tariffs have not yet been approved, they are unlikely to change much before they become official, according to Jim McMahon, Telecom New Zealand's ISDN implementation manager.

> The bottom line will be access costs of about $15,000 a year for 10 PRI circuits.
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"Our ISDN tariffs are in the final stages of ratification," McMahon said. "However, to assist planning and development of an ISDN strategy within an organization, we are offering these rates as a guide."

The ISDN tariff structure will consist of access and usage charges, plus an installation fee that will be a onetime fixed charge. Access charges apply for both BRI and PRI connections, and different charges will apply for circuit- and packet-switched connections, McMahon said.

The cost for a BRI connection, which supplies two 64K bit/sec channels, will be between 2.7 and three times the access charge for a business line on the switched telephone network. "This is consistent with the tariff levels associated with [BRI] service in most other countries," he said.

PRI connection, which supplies as many as 30 64K bit/sec channels over a 2M bit/sec link, will be charged at a rate equal to that currently charged for digital trunk interface (DTI) connections.

"A major difference will be that the minimum number of channels subscribed to by a customer will be 10, compared with the current 30, which will continue for a DTI connection," McMahon said.

The bottom line will be access costs of about $15,000 a year for 10 PRI circuits, with each additional circuit costing about $500 annually, he added.

Usage charges will be calculated on a time and distance basis, with no distinction between voice and data traffic.

"The objective is to tariff usage at rates equivalent to those that apply for telephone toll and local call charging levels on a per-channel basis," McMahon said. "No distinction between voice and 64K bit/sec traffic is envisioned."

A onetime installation charge completes the picture. It covers installation of a line and a net terminator unit at the customer premises and service activation by the carrier. The cost will be $500 for each BRI line and as much as $5,000 for each PRI site.

The service is set for introduction in mid-October. McMahon said the final tariff figures will be released within the next two months.

"If you were a duopolist faced with the fact of competition in 1997, you would be working your butt off, wouldn't you?"

Robin Davey
Chairman
Australian Telecommunications Authority

AUSTEL exec speaks out on competition

Head of Australian telecom regulators tells why, how competition will be opening up down under.

Q&A More and more countries are abandoning monopoly telecommunications regimes and moving toward more competitive environments.

One country marching down this path is Australia, which on July 1 enacted reforms that will allow one full-service carrier to compete with the country's monopoly domestic and international carriers. After 1997, full competition will be allowed.

As part of the reform, Australia is merging the government-owned domestic carrier Australian Telecommunications Corp. with the government-owned international carrier OTC, Ltd. to create a new carrier called Australian and Overseas Telecommunications Corp. (AOTC).

AOTC's initial competitor will be the buyer of the country's debt-laden domestic satellite service provider, Australian Satellite Communications Corp. (AUSSAT), using AUSSAT's facilities to supplement its own terrestrial facilities.

One of the two leading bidders for AUSSAT is a consortium lead by BellSouth Corp. and Cable & Wireless PLC. The other is a consortium lead by Ameritech, Bell Atlantic Corp. and Hutchison Telecommunications, Ltd. of Hong Kong. The Communications Satellite Corp., in Washington, D.C., also wants a stake in AUSSAT, according to Australian newspaper reports.

To better understand the changes taking place, *Network World* Senior Editor Barton Crockett recently interviewed the country's chief regulator, Robin Davey, chairman of the Australian Telecommunications Authority (AUSTEL).

Could you explain briefly what your responsibility is?

I'm the chairman of AUSTEL, which is charged with the regulation of the Australian telecommunications industry. It has both a standard-setting role and the role of promoting competition and protecting consumers.

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AUSTEL exec speaks out

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Could you summarize the major points of the reform legislation that was enacted in July?

The principle features are the establishment by the end of 1991 of a private sector competitor to a merged [Australian] Telecom and OTC. Each of the duopolists will be granted a mobile [telephone] license and will be allowed to supply public access cordless telecommunications services. A third mobile operator will be selected by the end of 1992 and will be licensed to begin operations in the second half of 1993. Full resale of domestic and international telecommunications capacity [will be allowed]. And [there will be] an end to the duopoly in 1997.

In the past, competition was allowed at the margins only, in value-added services and the supply of customer equipment and customer cabling. While private network services were allowed, resale was prohibited.

After 1997, will there be full competition?

Yes. Now that is subject, of course, to things like the availability of radio spectrum and all the other natural limitations that apply.

Could you tell me why the government decided on this course?

The efficiency of the Australian telecommunications industry is a major factor affecting the competitiveness of the entire Australian economy. And it's an essential service for nearly every Australian household. The objective in introducing the competitive regime is to improve that performance. The benefits of getting the competitive structure and the regulatory environment right are very significant.

Was there a sense that Australia's service providers were not keeping pace with countries such as the U.S. and Japan?

No. Generally speaking, the two Australian carriers were at the leading edge of the technologies available. But competition will ensure they stay there and improve.

Were Australia's two carriers offering services at a competitive price relative to other areas of the world?

> "The Australian carriers were at the leading edge of the technologies available. But competition will ensure they stay there."
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Well, pricing in a competitive environment is always keener. But its very, very difficult to compare prices internationally because there are so many factors that one has to qualify before you can make accurate comparisons.

How quickly do you think vigorous competition will emerge? Or do you even think it will emerge?

I'm confident that vigorous competition will emerge. But it's another question [to say how quickly because that depends on] the strategies of the different consortiums [bidding to buy AUSSAT].

In the U.S., people often question whether AT&T is abusing its dominant position in the market. Are you concerned that AOTC might take advantage of its historical inheritance?

There are a number of safeguards. For example, there's a clear provision against discriminatory pricing. And there's a rigid regime of cost allocation manuals and unbundling of service charges.

The requirements on AOTC are very clear. If, at the end of the day, we felt it was necessary to

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PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

Trend rolls out version of antivirus package

Trend Micro Devices, Inc. has announced Version 3.0 of **PC-cillin,** an antivirus program that can scan hard drives, conventional and extended memory, floppy disks, and .EXE and .COM files for viruses.

The version is installed as a device driver program to make it compatible with memory management programs, new operating systems, such as MS-DOS 5.0, and local-area networks. It also offers a viral filter that detects boot sector viruses when floppy disks are first inserted into a disk drive, thus helping prevent viruses from entering a system.

Other features of PC-cillin 3.0, which is compatible with Microsoft Corp. Windows, include command line options that permit automatic batch mode scans, configuration options that provide customized virus warning messages and the ability to scan for over 700 known viruses.

The product costs $139, and updates are provided free of charge from Trend's bulletin board system.

Trend Micro Devices, Inc., 2421 W. 205th St., Suite D-100, Torrance, Calif. 90501; (213) 328-5892.

TRW unveils automatic fax encryption machine

TRW Information Security Division has announced the **TRW Fax Encryptor 300,** a stand-alone device that can be used with existing Group III facsimile machines to automatically encrypt transmissions.

The Encryptor 300 provides an audit trail of all transmissions. Each page received includes an authentication banner noting the data and time, a secure stamp and the serial number or group code of the sending encryptor.

Networks of encryptors can include as many as 100 sites or eight groups of fax networks with no limit to the number of participants in each group. The device costs $1,995 and is available now.

TRW, Inc., 3183 Duncan Lane, San Luis Obispo, Calif. 93401; (805) 544-2786.

Lexcel adds new features to SNMP tool

FULLERTON, Calif. — Lexcel, a new company formed by Micro Technology, Inc. to take over the Lance net management product line, last week released Version 3.0 of the SNMP-based offering.

The new version, called Lance+, adds network management support for vendor-specific devices, a more robust map editor and a relational data base management system. It runs on Sun Microsystems Corp. platforms as well as Digital Equipment Corp. DECstations and VAXstations.

Lexcel was spun off as an independent company that would focus solely on network management, according to Tom Raimondi, vice-president of product marketing at Lexcel.

Raymond Noorda, a principal investor in both Micro Technology and Lexcel, is serving as chairman of the board for the two companies. He is also chairman and chief executive officer of Novell, Inc.

Like the earlier versions of Lance, Lance+ is a management station that supports the Simple Network Management Protocol (SNMP) and is capable of managing devices that support SNMP net management agents.

With this version, customers can control vendor-specific devices such as Cabletron Systems, Inc. local-area network wiring hubs and Cisco Systems, Inc. routers, Raimondi said. Earlier versions of Lance simply allowed users to manage classes of devices, such as hubs and routers.

Adding vendor-specific support will enable customers to manage target devices as if they are using the vendor's own net management system. Lance+ will support all the standard objects in SNMP Management Information Bases (MIB) as well as vendor-specific private MIB extensions, Raimondi said.

The product's map editor has also been enhanced to support infinite mapping. This feature makes it possible to show links between cities, an expanded view of the configuration in one city and so on down to the port level.

Lexcel added support to Lance+ for an Ingres Corp. relational DBMS for managing information gathered from the net. The data base provides for more flexible report generation, enhanced configuration management capabilities and the ability to produce color reports, graphs and plots.

Lance+ costs $20,950 and will be available for delivery beginning Sept. 30.

Lexcel can be reached at 2600 E. Nutwood Ave., Fullerton, Calif. 92631; (800) 925-2623.

Mux provides integrated voice/data access to T-1s

CHERRY HILL, N.J. — Dowty Communications, Inc. recently introduced its T-1 Network Access Multiplexer, a device which acts as a channel service unit and intelligent channel bank to combine voice and data onto a single T-1 line.

Dowty Communications' DCP-9506 T-1 Network Access Module provides users with a more efficient data transmission setup than maintaining separate lines for voice and data traffic.

For some users who couldn't cost-justify a T-1 to support a single data type, the DCP9506 will enable them to support multiple traffic types on a T-1 to make efficient use of the bandwidth, according to Scott Ledgerwood, vice-president of marketing at Dowty.

The multiplexer can combine switched and dedicated data lines and voice circuits for transmission over a T-1 connection. It can collect as many as 30 data channels, 24 voice channels or a mix of the two, combining them onto a T-1 line.

The DCP9506 is similar to the vendor's DCP9401 except it has six rather than 12 slots for voice, data and subrate multiplexing and T-1 cards.

Ledgerwood explained that the device is compatible with AT&T's Accunet Spectrum of Digital Services, US Sprint Communications Co.'s Integrated T-1 Access Partitioning and other carriers' offerings.

Optional features include a five-channel, subrate, data multiplexing card, switched 56K bit/sec service interfaces, a local T-1 drop-and-insert card, an NX56 and 64K bit/sec data card, as well as two- and four-wire voice cards.

DCP9506 pricing ranges from $2,750 to $9,000. It is available now.

For further information, contact Dowty Communications at 55 Carnegie Plaza, Cherry Hill, N.J. 08003, or call (609) 424-4451.

Micom unveils mux to meld voice, data

Marathon 1K lets users consolidate remote-site traffic onto single low-speed dedicated circuit.

SIMI VALLEY, Calif. — Micom Communications Corp. last week announced a data/voice multiplexer that enables users to consolidate data from multiple lines onto a single dedicated circuit connecting two sites.

The company's Marathon 1K Data/Voice Network Server uses a combination of data/voice compression, facsimile demodulation and fast packet processing to merge local-area network, voice and Group III fax data over a single wide-area network leased line running at up to 64K bit/sec.

With a base price of $1,750, the Marathon 1K offers greater functionality than data-only multiplexers and enables users to reduce telecommunications costs by eliminating toll charges for switched traffic running across multiple voice and data lines, according to Micom officials.

Adding voice and fax traffic to a dedicated circuit between a remote or branch office and a headquarters site eliminates switched charges on interoffice telephone calls and faxes. It also reduces the need for tie lines between sites, the vendor said.

"It doesn't make sense to pay the phone company for interoffice voice or fax traffic when you can let it ride over an existing leased-line network," said Kenneth Guy, vice-president of corporate strategy and business development at Micom.

Guy said users with as little as one to two hours of traffic a day could benefit by integrating different traffic types via the Marathon 1K.

The multiplexer is a tabletop or rack-mountable unit with internal data and voice/fax modules. Each unit can support as many as 41 directly attached asynchronous devices (operating at up to 38.4 bit/sec) and one synchronous channel (operating at up to 19.2 bit/sec).

The synchronous channel supports connections to an IBM Systems Network Architecture cluster controller, X.25 link or LAN bridge/router.

Both asynchronous and Binary Synchronous Communications connections are compressed at rates up to 4-to-1 and then fast packet multiplexed over the wide-area link.

As many as four voice/fax connections can be supported by the Marathon 1K. Each voice card has built-in adapters for direct connection to private branch exchanges, key systems and telephones. Each connection can automatically compress speech and demodulate fax signals. The Marathon 1K can compress voice from 64K to 4.8K bit/sec, freeing the line for additional data.

LAN traffic is imported into the multiplexer via the synchronous data port and fast packet multiplexed along with other data.

Micom said users can deploy the Marathon 1K at a remote site and tie it into either another Marathon 1K, a high-end Marathon 5K or Micom's MB multiplexers at another site.

> "A user can send LAN traffic over more affordable lines than dedicating a T-1."
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Gary Borad, product manager of WAN products for Micom, said the Marathon 1K fast packet processor can dynamically allocate bandwidth to LAN data on demand to handle large bursts.

"The idea is that the user can send LAN traffic over much more affordable lines than having to dedicate a T-1 and leave much of it sitting idle to service peak loads," he said.

According to Guy, two channels of voice/fax traffic and 10 terminals can easily share a 19.2K bit/sec line, while 28 terminals and four voice/fax devices can share a single 56K or 64K bit/sec circuit.

The Marathon 1K base configuration costs $1,750, which includes software, one synchronous data channel, four asynchronous data channels and one wide-area channel. Voice/fax modules are priced at $1,400, and data expansion modules cost $1,150.

The Marathon 1K is scheduled to ship next month.

For further information, contact Micom at 4100 Los Angeles Ave., Simi Valley, Calif. 93063, or call (805) 583-8600.

OPINIONS

NETWORK PLANNING

BY BILL GLEASON

Wanted: users unafraid to use the network

The company where I work does not have a network. Does that surprise you? It sure surprised me.

When I started working at this multimillion-dollar manufacturing operation two years ago, I encountered stand-alone desktop microcomputers in abundance, one minicomputer and users of every level of computer education and experience. What I didn't find was a basic understanding of why computers are the way of the future, why they only help when we let them, or why and how they can provide user firms with a strategic advantage over their rivals.

Since my arrival, upper management has imposed a plan calling for a network that ties together the many desktop systems and the minicomputer. However, this plan doesn't include the basic understanding I'm seeking. Although well researched and reasonably well implemented, it is a business plan, not a computer plan. The plan won't cause the demise of our company, but the impetus for it is simply to make the business run more smoothly and impress our customers with empty buzzwords. Because of that, I view it as a failure from the start.

> We can easily upgrade our computers; unfortunately, it's not as easy to upgrade the end users.
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I hope this situation doesn't sound familiar to you because, quite frankly, it scares the hell out of me. We're a Fortune 500 company, acting as a Fortune 500 company should act: We're keeping up with technology, upgrading software and trying to guarantee quality in manufacturing by using computers better.

Why does this scare me? It scares me because since I first started in computers in the early 1970s, I've seen more generations of technology go by my keyboard than I can even remember, but I'm still the same generation I was when I started. In other words, the computers evolve but the people who use them don't.

We can easily upgrade our computers; unfortunately, it is not as easy to upgrade the end users and the people who administer those computers.

I have a computer at home running one of the first microcomputer operating systems — CP/M. It still works fine. If I wanted to, I could upgrade it by making a phone call. Upgrading the IBM Personal System/2 I have on my office desktop is not difficult either. In fact, if it became necessary, I could just buy a new one for less money than we currently spend on bottled water for the office.

But I can't upgrade the people at work who use computers. At best, I can offer to send them to classes at the local college, but I can't make them learn. I can't demand they spend years of their lives to become more proficient.

So, we'll get a network. It will have all sorts of bells and whistles. I'll love it, except when I find out we're not getting anyone to support it except the people who were here when we didn't have a network.

In the end, we'll make it work because we must. But when all is said and done, the users won't use it any more than they use the stand-alone computers they have now. The company needs this network, but what I need is people who are not afraid to use it.

Gleason is a metallurgical engineer and personal computer coordinator at Kennametal, Inc., a primary metals producer located in Fallon, Nev.

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An IDG Communications Publication

EDITORIAL

Sikes' plan for long distance falls far short of ideal

Almost two years ago, Federal Communications Commission Chairman Alfred Sikes struck out to replace the piecemeal, case-by-case process he said was creating a lopsided set of rules in the long-distance industry. He attempted to create a comprehensive framework to guide the industry and to make regulation more fair. But some critics say the plan he unveiled earlier this month falls short because it creates more confusion than it eliminates. How did this happen?

Sikes inherited a patchwork of rules, and because he showed no inclination to reverse those earlier decisions, he had to fuse his new framework on top of them. Sikes also ignored or overlooked lessons he could have learned from his predecessors. He was convinced that it is possible to segment the long-distance market and apply different regulation to each piece.

Hence, we have the FCC's ruling earlier this month that some services will remain under price cap regulation while others will not as well as the decision to allow most business services — with the exclusion of 800 service — to be sold through contract.

However, many believe that long-distance services are highly integrated both in the way customers use them and the way carriers provide them, making regulation by service almost impossible.

Critics say privately that Sikes was so enamored of the idea of lessening regulation for AT&T that he failed to consider other methods of evening up rules in the long-distance industry that might have been less disruptive.

Since competitors such as MCI Communications Corp. and US Sprint Communications Co. were initially freed from regulation because they were thought to be too small to drive others out of the market, why not reimpose tariff filing requirements on them now that they are multi-billion-dollar firms? That would have caused great grumbling from those carriers, but it would have spared users much of the confusion, anxiety and legal battles they will now have to go through.

Or instead of barring AT&T from offering 800 service through Tariff 12 or contracts, the FCC might have required AT&T's customers to change from their existing 800 numbers, in which they have invested a great deal of advertising money, to new ones when purchasing one of these two types of custom deals. Such a requirement would have eliminated any advantage AT&T may have had in convincing users to stay with AT&T because switching to a competitor would mean giving up their 800 number.

OPINIONS

MACROSCOPE

BY JAMES KOBIELUS

The vision of a national research net needs rethinking

Like the highway systems to which they are often compared, telecommunications networks can realign the paths of trade and commerce. For example, big cities enjoy a distinct competitive advantage over smaller communities because cities have access to a wider variety of telecommunications services.

Recognizing the potential of advanced networks to confer competitive advantage, federal policymakers have proposed the National Research and Education Network (NREN), a broadband network that uses fiber optics, high-speed packet or cell switching as well as other sophisticated information technologies.

NREN's purpose is to bolster U.S. economic competitiveness by providing a medium for information sharing and collaboration between government, corporate and academic scientists, engineers, researchers and educators. The network would have the capacity to support real-time display of bit-mapped graphical output from an executing supercomputer model, such as global meteorological simulation, medical image transfer, parallel computation, access to multimedia digital libraries and other critical research-oriented applications.

Unfortunately at this time, NREN is more of a political field of dreams than a technological blueprint. The most popular proposal is to implement NREN as an upgrade to the National Science Foundation Network (NSFNET). But if implemented only as a souped-up NSFNET, NREN will do little for U.S. global competitiveness because it would exclude the majority of the private sector.

Kobielus, a contributing editor to Network World, *is a telecommunications analyst with Fairfax, Va.-based Network Management, Inc., one of the largest local-area and wide-area network systems integrators in the U.S.*

National competitiveness depends on our providing private enterprise with access to state-of-the-art telecommunications and information, not on keeping the technology locked away in a laboratory.

Some people have proposed opening NSFNET — and hence, NREN — to commercial traffic based on the model of today's value-added packet networks. This idea is both bad economics and bad politics.

The U.S. has a tradition of encouraging private enterprise, even for critical infrastructures, such as telephones and electricity. A government-operated broadband national network would be a competitive white elephant and a drain on the national treasury in a marketplace that would almost certainly include more nimble, efficient commercial carriers.

> NREN is more of a political field of dreams than a technological blueprint.
>
> ▲▲▲

The NREN vision needs rethinking. What this country needs is not just a federally funded and sponsored broadband research and development network — although a gigabit upgrade to NSFNET is certainly well justified. The federal government should implement NREN within the context of a three-pronged national broadband policy, and should:

■ **Sponsor basic R&D.** The government should continue to promote basic R&D into precompetitive broadband transmission, switching, protocol processing, network management and related technologies. In particular, multiyear funding should be expanded for the existing NSF/Defense Advanced Research Projects Agency gigabit network test beds. Federally funded R&D test beds — involving major industrial and academic participants — are essential to developing and disseminating the technologies that will make broadband a commercial reality in this country.

■ **Build a commercial market.** Broadband network technologies will languish in the labs unless there is a strong commercial market for these technologies and the services they make possible. The biggest obstacle to a broadband America is the paucity of fiber in the local loop, which is partly the result of the Modified Final Judgment line of business restrictions on the regional Bell holding companies.

U.S. District Court Judge Harold Greene's recent decision to let the RBHCs provide interactive video and other broadband information services over their local-area networks was long overdue. By being allowed to compete in this potentially lucrative market, the RBHCs will have every incentive to accelerate the laying of fiber.

■ **Establish a showcase national network.** The federal government should implement a showcase broadband network, the National Public Access Network (NPAN), which would be accessible to all Americans. Paid for with tax dollars, NPAN would be the NREN for the masses. Accessible through gateways nationwide, NPAN would be a logical extension of the government's traditional information publishing activities. NPAN's interactive applications — such as hypermedia access to the Smithsonian Institution and Library of Congress collections — would stimulate the demand side of the national broadband equation.

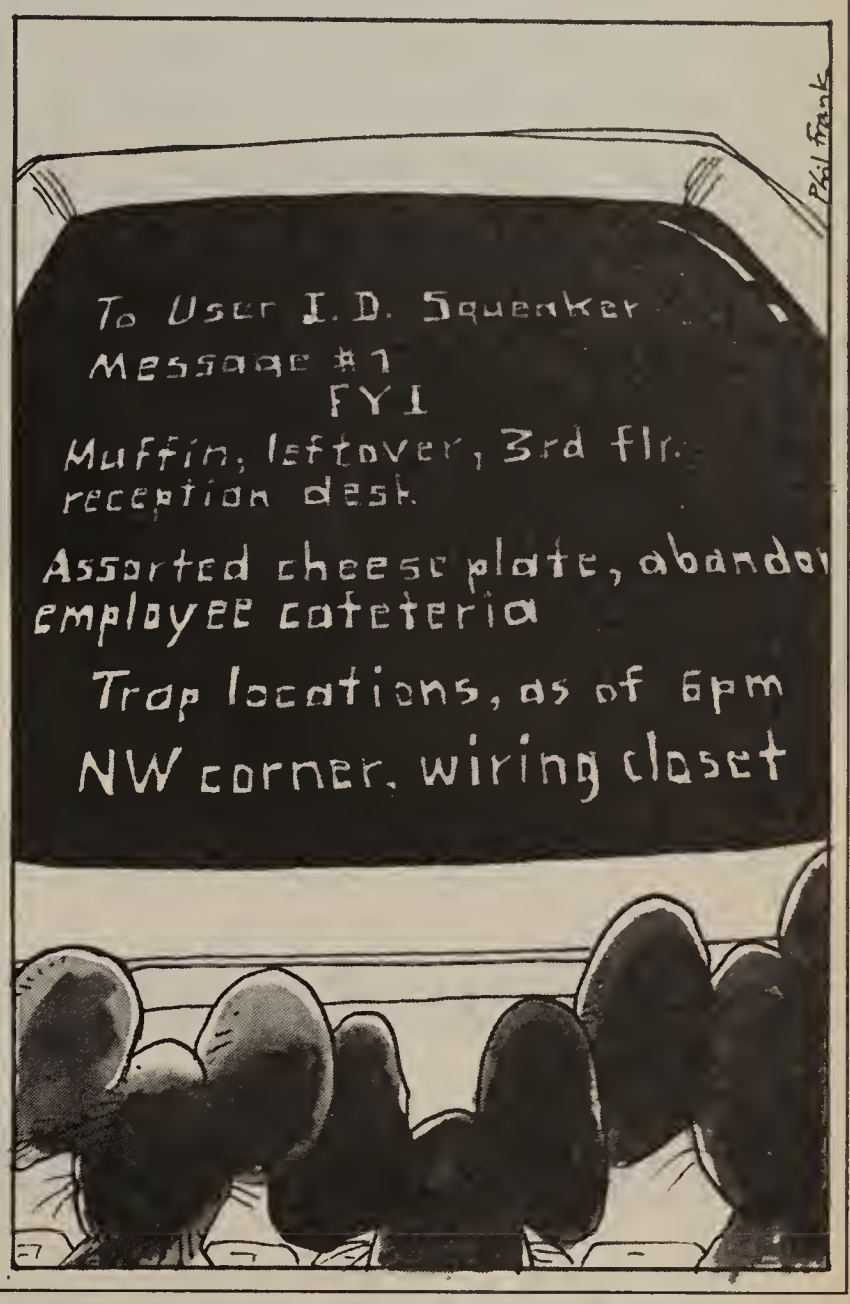
Although the broadbanding of America will take many decades to complete, the government can and should supply the initiative and resources needed to place this matter high on the national agenda.

LIKE ALLIGATORS IN A SWAMP, unforeseen problems can really put the bite on a communications operation. Many managers find themselves wrestling with these networking reptiles every day.

If you've survived an "alligator attack," share it with our readers by calling Susan Collins, associate features editor, at (508) 820-7413 or fax your idea to us at (508) 820-3467. Alligators should be 1,200 words in length and submitted either on disk or via modem.

TELETOONS

BY FRANK AND TROISE



LETTERS

The aggregator difference

It's possible that readers might misunderstand the difference between resellers, rebillers and aggregators, the latter of which are mentioned in the column "Beating the aggregators at their own game," (*NW,* July 29). The term "aggregator" belongs to the legitimate aggregator only.

Aggregators differ from resellers and rebillers in the following ways:

■ Aggregators cannot render usage billing to the end user under any circumstances.

■ Aggregators do not have either the capability or authority to disconnect or threaten to disconnect any end user's service. Nor can they request that AT&T do so, even if a client with whom they are jointly and severally financially responsible is seriously in arrears with them, AT&T or both.

■ Aggregators do not supply network service. They do, however, offer participation in their subscribed-to, tariffed, discounted billing programs, which are AT&T general offering programs.

■ Aggregators do not buy or lease lines, time or private networks at a discounted or bulk price and profit through markup at the time of resale or rebilling.

■ Aggregators do not bill clients directly. Rather, their clients continue to receive monthly usage and service charges for discounted billing programs directly from AT&T. Resellers and most rebillers render end-user bills under their own logo.

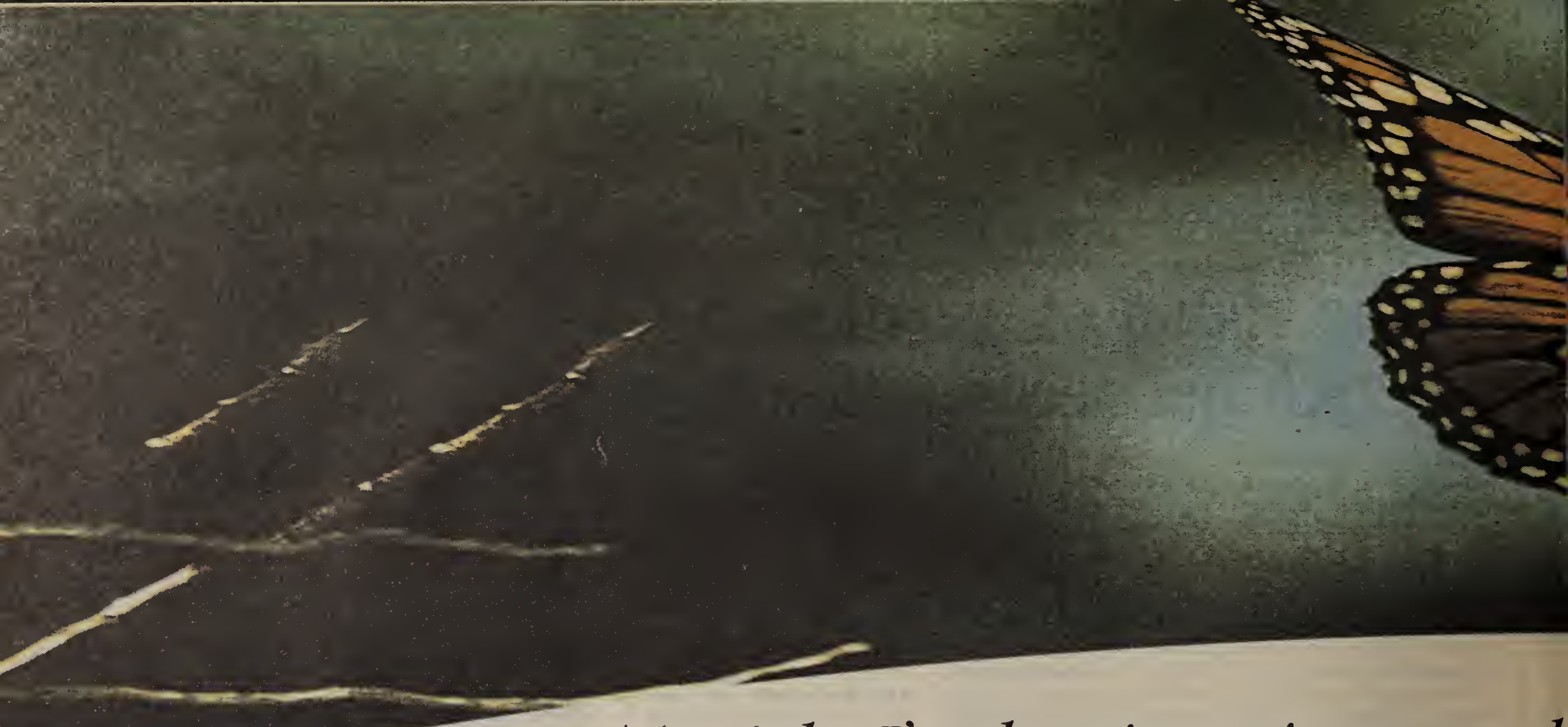
■ Aggregators do not withhold any portion of the discount structure offered under their discounted billing programs from their end users. In addition, aggregators receive

(continued on page 49)

Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.



Tonight I'm having pizza and

There's pepperoni on one and a program about happens hordes of monarch butterflies from hillside in Mexico every year. Sure this is has had millions of years to figure out where it out how to get customers' calls from all over the big-time Call Center features like call vectoring on number dialed, day of the week, agent Management Software does all this controlling only language the monarch can communicate and the program were over, as was my debate recommending. So, who says watching TV can't

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the monarch butterfly on the other. As it North America find their way to the same little impressive, I think to myself, but the monarch should go while AT&T's DEFINITY® *ACD figures world to the right agent in only seconds. It has that allows me to route calls intelligently based availability—almost anything. And AT&T Call and tracking in simple English. Whereas the in is "monarch." And before I knew it the pizza over which ACD I should be be very enlightening?*

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The server approach to LAN internetworking

By LLOYD TAYLOR

Mention LAN internetworking and tools such as bridges and routers typically come to mind. However, increasing numbers of local-area network users are considering a new, higher level approach to internetworking based on servers.

Bridges and routers transfer packets between LANs, a relatively low-level function. By contrast, servers provide the basis for an intelligent inter-LAN information flow. We could consider this to be routing at the highest level — the application layer.

For example, to access corporate data outside the LAN, a bridge or router must be told where to send the packets. Unless each workstation keeps an up-to-date file of all corporate data bases, the logical processor to perform this function is likely to be the local server.

But do traditional local servers have the capacity to maintain all the network addresses — not merely of individuals but of data bases and network services — on the hundreds or thousands of workstations of a major corporation?

For that matter, should they? Maybe local servers only need to know the location of data within a particular department or site and queries regarding data located elsewhere would be passed to a "server of servers," a regional server or a specialized server. This thinking has produced two models for internetworks involving servers: the hierarchical architecture and the matrix architecture.

As its name implies, the hierarchical approach involves layers of servers. Since the pattern of data interchange within a company usually mirrors its organizational structure, this model tends to be best suited for firms that are strongly hierarchical.

On the other hand, the matrix approach, which involves a single layer of specialized servers, tends to work best in more entrepreneurial organizations, where the lines of authority are less defined and data interchange cuts across the organizational structure.

Many computer and network equipment vendors, including IBM and Digital Equipment Corp., are working toward supporting both models.

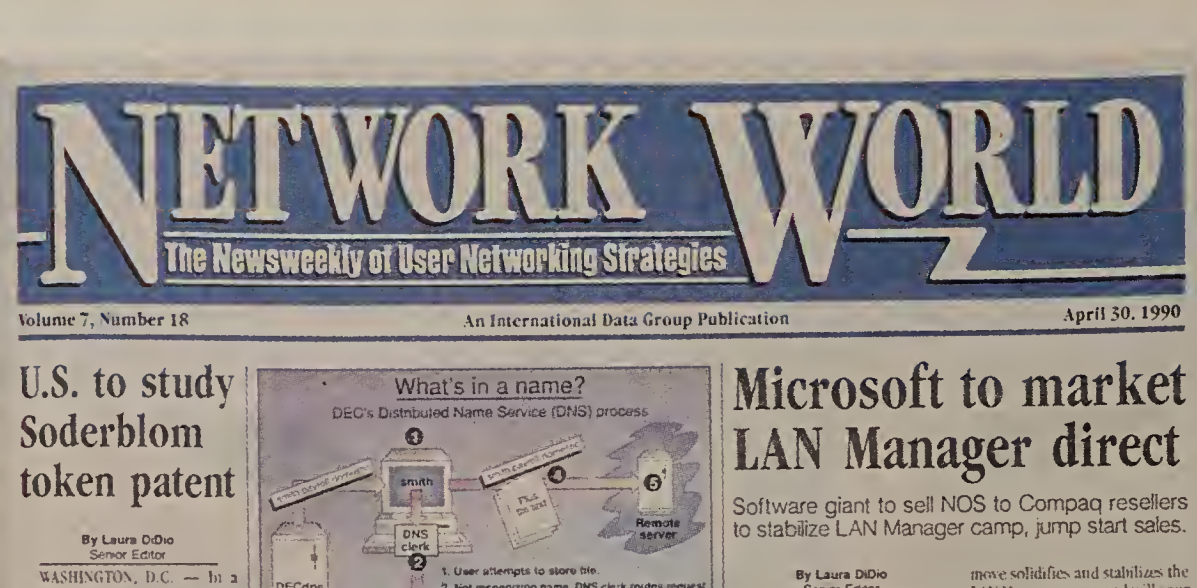
In the hierarchical model, the personal computers and worksta-

(continued on page 40)

A server-based strategy provides a high-level way of handling inter-LAN data flows.

Taylor is a telecommunications and networking manager with the Applied Physics Laboratory of Johns Hopkins University in Laurel, Md.

THE BEST READ MOST IMPORTANT MOST USEFUL Networ



NETWORK WORLD

The Newsweekly of User Networking Strategies

Volume 7, Number 18 | An International Data Group Publication | April 30, 1990

U.S. to study Soderblom token patent

By Laura DiDio
Senior Editor

WASHINGTON, D.C. — In a move that could spell trouble for Olof Soderblom's token-passing patent and monetary relief to his 50 licensees, the U.S. Patent and Trademark Office has agreed to reexamine the validity of Soderblom's patent.

In its 1½ page decision, the Patent Office stated that the reexamination request from an anonymous vendor was granted in view of earlier patents issued to four engineers — including two from AT&T Bell Laboratories — before Soderblom was granted his patent in 1981.

"A substantial new question of patentability affecting Claims 23 to 33 of U.S. Patent No. 4,493,948 to Soderblom is raised by the request," the Patent Office statement said..

The 10 claims in question deal with open and closed data transmission loop schemes and are central to the issue of whether Soderblom's existing patent is applicable to today's token-ring and Fiber Distributed Data Interface local-area network technologies.

Invalidation of the patent or amending even portions of the patent could effectively render null and void the current licens-

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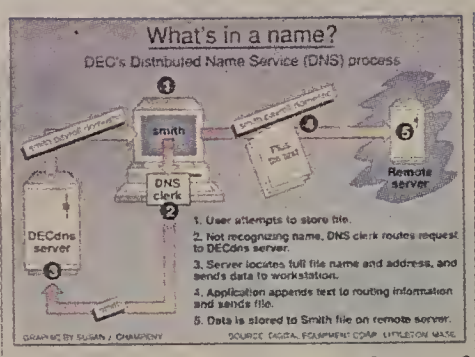

DEC describes benefits of X.500 directory services

X.500 will extend DNS offering to incorporate non-DEC devices in DECnet Phase V directories.

Later this year, Digital Equipment Corp. is expected to announce DECnet Phase V, a major revision of its network software that will support the full suite of Open Systems Interconnection protocols.

According to Jane Brewer, DEC's product marketing manager for enterprise networking within DEC's Telecommunications and Networks Organization, one key component of that announcement will be support for the X.500 directory services standard, which promises to give network administrators greater control over the hardware and software elements in their networks.

In an interview with *Network World* Assistant Managing Editor Charles Bruno, Brewer described the full potential of X.500 directory services and laid out DEC's strategy to support the technology within DECnet Phase V.

(continued on page 59)

Microsoft to market LAN Manager direct

Software giant to sell NOS to Compaq resellers to stabilize LAN Manager camp, jump start sales.

By Laura DiDio
Senior Editor

REDMOND, Wash. — In an attempt to boost lagging sales of its LAN Manager network operating system, Microsoft Corp. last week announced it will sell a version of the product directly to select Compaq Computer Corp. value-added resellers.

Microsoft's decision to put its marketing muscle directly behind LAN Manager is viewed as crucial if the product is to compete successfully with Novell, Inc.'s NetWare, which commands 60% of the network operating system market today. LAN Manager has only been available through OEMs to date.

"By selling its own version of LAN Manager, Microsoft is giving users freedom of choice," said Craig Burton, executive publisher of the *Clarke Burton Report*, a monthly research magazine. "Users will no longer be constrained to buying versions of the product that only work with a particular OEM's hardware. This will help accelerate the acceptance of LAN Manager."

Jonathan Yarmis, vice-president of the personal computer service at Gartner Group, Inc. in Stamford, Conn., agreed. "The move solidifies and stabilizes the LAN Manager camp and will spur application development.

"Microsoft and its OEMs have to present a unified front, especially in light of Novell's merger

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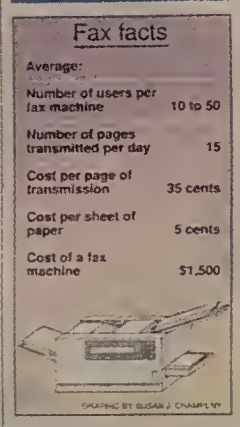


Net execs try to tame fax monster

By Tom Smith
New Products Editor

The explosive growth of facsimile machines has created a costly monster of which few companies are aware, let alone able to control.

Most large companies don't even know how many fax machines they have or how much they are spending on dial-up fax transmissions.

"It's like trying to manage envelopes or pieces of paper," said Bob Craig, vice-president of international network planning for The Chase Manhattan Bank, N.A. in New York. "People don't think it's worth the cost of managing it."

Yet the costs can be staggering. Annual transmission costs can be in the tens of millions of

(continued on page 8)

NETLINE

AT&T TRIDOM plans to trial a pan-European VSAT network with two users. Page 2.

A TARIFF IS USER is the loser in a heated battle between MCI and AT&T. Page 2.

VENDORS AIMING for FDDI interoperability form a testing consortium. Page 2.

3COM ELECTS Benhamou to the post of president. Page 4.

AMEX AWARDS MCI with a service contract that could be worth up to $100m. Page 4.

US SPRINT EXTENDS VPN services into international markets. Page 4.

PRIVATIZING TELECOM in Eastern Europe is a question of capital. Page 45.

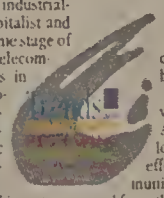
NEWSPAPER

FEATURE

Telecom privatization will aid int'l users

By Norman Lerner
Special to Network World

Most countries — industrialized, developing, capitalist and socialist — are at some stage of restructuring their telecommunications systems in order to accommodate and take advantage of the great political and economic changes now sweeping the globe.



In many places, this restructuring is taking the form of privatization of formerly nationalized telecommunications systems. This important trend raises major questions for multinational users of telecommunications services, including Where is this happening and why? How will it affect the way we do business? And what will be the long- and short-term effects on telecommunications services to and from these countries?

This article examines the trend toward privatization in

(continued on page 38)

The results are in and **Network World** is the clear leader. The 1990 Wall Street Journal/ICA Member Study is conducted among members of the prestigious International Communications Association (ICA), an organization whose representatives purchase $16 billion of information technology products and services each year.

Since **Network World** began in 1986, we've maintained a singular focus: to be the most useful source of information for users involved in multivendor, multisite enterprise networks and, in doing so, provide the most value for our advertisers.

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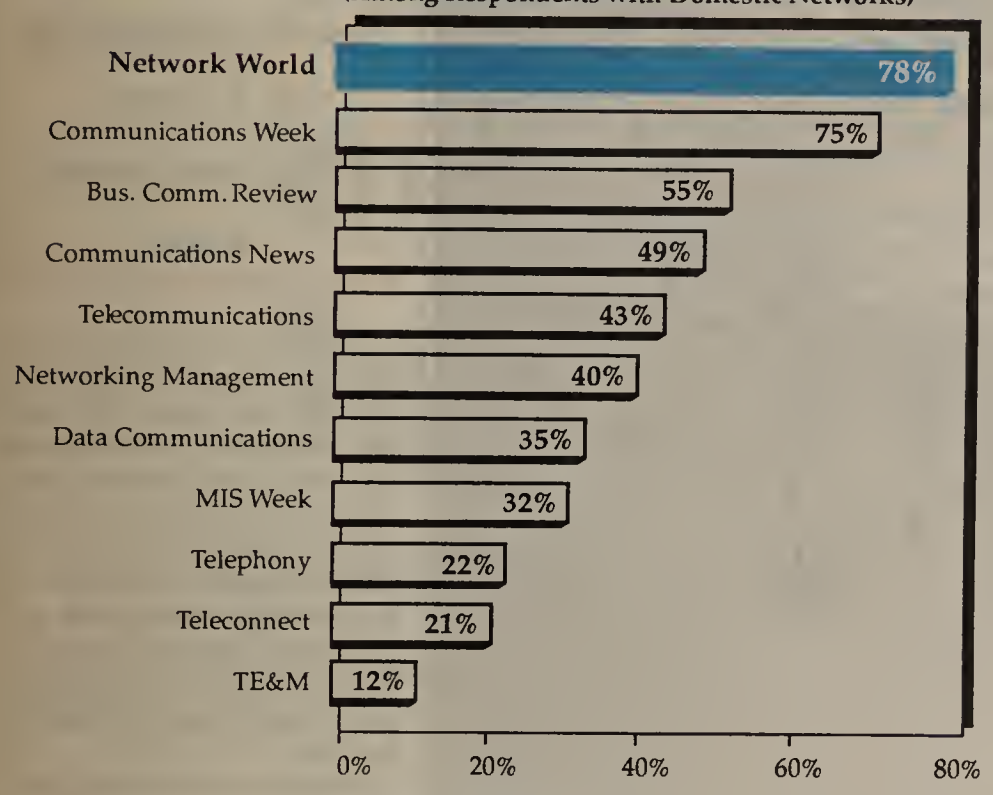
Domestic Regular Readership

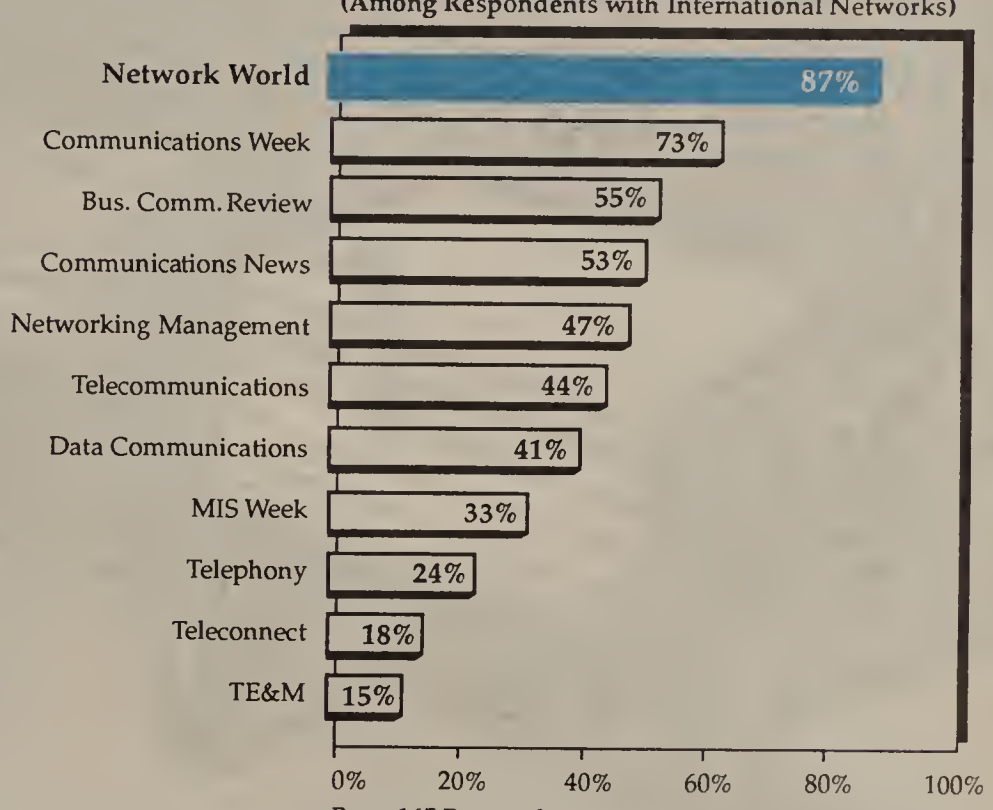
(Among Respondents with Domestic Networks)



Base: 336 Respondents
Regular readership is at least three out of four issues.

International Regular Readership

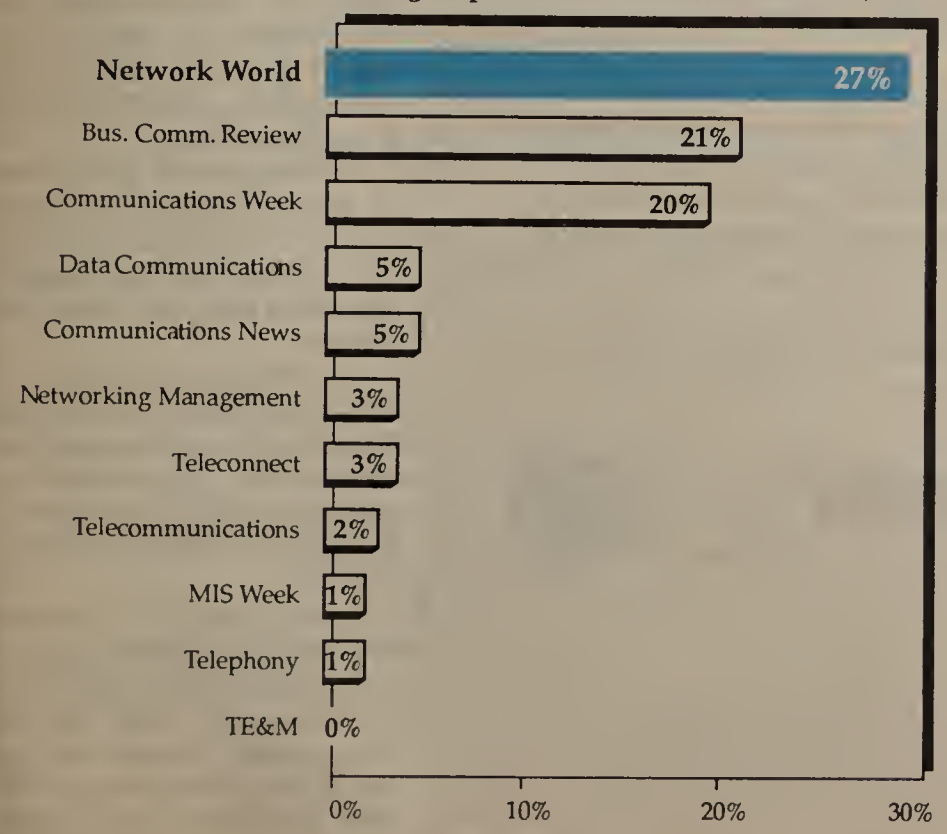
(Among Respondents with International Networks)



Base: 165 Respondents
Regular readership is at least three out of four issues.

Domestic Most Important/Useful

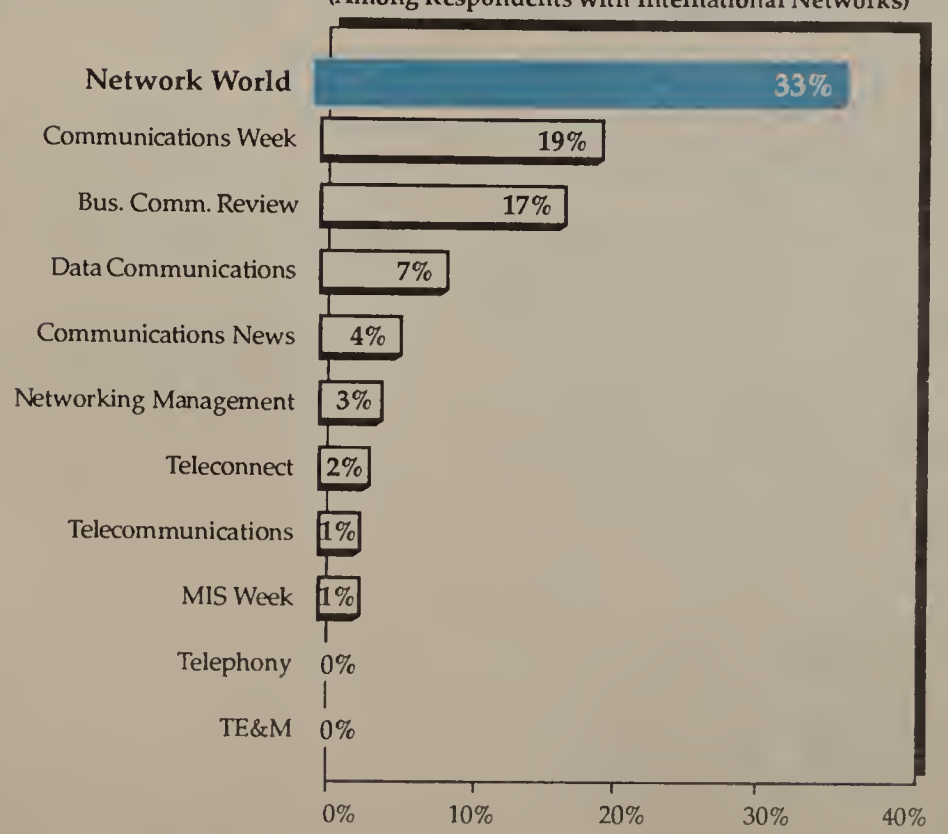
(Among Respondents with Domestic Networks)



Base: 336 Respondents

International Most Important/Useful

(Among Respondents with International Networks)



Base: 165 Respondents

Source :1990 Wall Street Journal / ICA Member Study

(continued from page 37)
tions on each LAN are connected to a LAN server. All of the servers, in turn, are connected to a remote server of servers.

In addition to extensive files of addresses of individuals, data bases and programs, the server of servers could contain a corporate SQL data base or a file of common read-only data, such as a procedures manual or a telephone directory.

When an end user on the LAN requests data not available locally, the LAN server routes the request to the server of servers, transparently adds any pertinent information from its own data base and presents the combined information to the end user as a unit (see Figure 1, page 50). But to the user, the hierarchy of servers appears to be a single, integrated server.

In addition, the LAN server can pass locally generated data base updates back to the server of servers. In this way, the central data base is kept up to date with the latest information from the field.

Thus, in the hierarchical model, the LAN servers and the server of servers have a peer-to-peer relationship — information flows in both directions, and each server can update the other — while the workstations and LAN server have a client/server relationship.

A real-world example of the hierarchical server model is in use at the University of Michigan in Ann Arbor. The university's Institutional File System project, which started in October 1988, uses a hierarchical server system to support 30,000 computers, including Apple Computer, Inc. Macintoshes, MS-DOS and OS/2 personal computers as well as Unix workstations.

"With the continuing evolution away from central time sharing and toward a distributed computing environment, we needed a universitywide facility that would enable data sharing for thousands of heterogeneous desktop systems," says Ted Hanss, director of the project at the university's Center for Information Technology Integration.

> The hierarchy of servers appears to be a single, integrated server.
>
> ▲▲▲

According to Hanss, the university is housed in more than 200 buildings across 20 square miles. All offices, classrooms and dormitories are networked using unshielded twisted-pair wiring. This standard wiring is used for Ethernet, Apple's LocalTalk and asynchronous connections to a proprietary packet-switched network that supports the Transmission Control Protocol/Internet Protocol.

"We have implemented a hierarchical structure, based on the Open Systems Foundation's (OSF) Distributed Computing Environment (DCE) standards, for our primary and intermediate file servers," Hanss explains.

The university uses two layers of servers — intermediate and central. The central servers are IBM 3090-class mainframes, while the intermediate servers are based on an IBM RT Personal Computer platform.

The intermediate file servers are user-transparent, low-maintenance "caching servers" that provide file services for a department, work group or student laboratory.

According to Hanss, these intermediate servers, located near the user workstations, relieve the central server and network of a substantial work load and deliver files quickly to the client workstation.

Central support is provided through administration applications that run on the central server, Hanss says. These applications provide services such as data backup and recovery, software distribution and updates, maintenance of user accounts and load balancing for multiple

(continued on page 50)

SNMP
Test Series

The lowdown on SNMP hub agents

CONTINUED FROM PAGE 1
few cases, net managers might question whether some hubs touted as SNMP-manageable really are because they support virtually none of the standard SNMP data objects. These objects define the items of management data collected or stored within a device's SNMP agent that can be retrieved by SNMP management systems.

As we discovered in previous tests examining SNMP-manageable bridges ("Network World, Bell Labs evaluate SNMP on bridges," *NW,* April 22) and routers ("Network World, Bell Labs test routers' SNMP agents," *NW,* July 1), implementations of SNMP standards are not all the same.

But while the differences between bridges' and routers' SNMP implementations can be viewed as subtle, fine-tuning distinctions, the variations between vendors' implementations for hubs and concentrators is quite another story.

This is not to say that SNMP failed as a useful or practical means for managing hubs and concentrators, which consolidate multiple LANs and, in some cases, wide-area network interfaces in a single desktop unit or multislot chassis. Test results show that the 10 hubs and concentrators tested were generally easy to configure

(continued on page 42)

Network World, Bell Labs find lack of standard objects hinders effective hub management

Mier, president of Mier Communications, Inc., a Princeton Junction, N.J.-based networking consultancy, was project head of the Network World/ ***AT&T Bell Laboratories SNMP Lab Test Series when this test was conducted.***

NETWORK WORLD

Variations in hub/concentrators' SNMP support

Vendor	Concentrator/hub tested	Configuration	SNMP setup, connection: Is device easily configurable for SNMP management, and were generic SNMP managers able to readily access the SNMP agent?	Port-by-port management: Could the manager obtain clear status, configuration and performance data on all ports via the standard SNMP MIB objects?	MIB II support: Did agent respond to SNMP queries for objects defined in the newer MIB II?	Setting values: Was the manager able to remotely change the values within the agent of SNMP read-write object variables?	Trap response: After an unexpected power interruption, did the agent issue the appropriate SNMP Trap alarm message?
AT&T Computer Systems Morristown, N.J. (800) 247-1212	SmartHUB, firmware Version 9.5	Fixed-configuration hub with 1 AUI and 12 10Base-T ports; console/terminal access via an RS-232 (DB-25) port	Yes. However, only 1 manager's address can be stored in the agent for Trap reporting.	No. The standard MIB interface objects are not implemented; effective management relies on vendor's private MIB (see chart on vendor-specific MIB loading).	No. Responses indicated agent did not support MIB II objects.	The vendor's private MIB objects that we tested could be set. However, few of the standard read-write objects were implemented.	Apparently, because a "cold start" Trap message issued by the agent 0.3 min after power restoral was recognized by 1 of the 2 managers.
Cabletron Systems,Inc. Rochester, N.H. (603) 332-9400	Multi Media Access Center-3, software Version 1.0	3-slot chassis with a 12-port 10Base2 module and an 8-port AUI module; console/terminal access via an RS-232 (DB-9) port	Yes. System features logical layout and port/slot numbering; agent supports as many as 8 managers concurrently.	No. SNMP-standard object support is minimal and requires vendor's private MIB, which we were unable to load (see chart on vendor-specific MIB loading).	No. Responses indicated agent did not support MIB II objects.	The standard read-write objects we tested could not be set; setting of vendor's private MIB read-write objects could not be tested.	No. Proprietary Trap messages were issued, not the expected "cold start" generic Trap.
David Systems, Inc. Sunnyvale, Calif. (408) 720-8000	ExpressNet LAN Intelligent Concentrator, supervisor firmware Revision 3.0	5-slot chassis with a 12-port 10Base-T module and 1 AUI port on supervisor module; console/terminal access via an RJ-45 port	Yes. However, saving SNMP parameters requires that the system be reset; defining managers (as many as 10 are concurrently supported) could be simplified.	No. SNMP-standard object support is minimal; effective management requires vendor's private MIB (see chart on vendor-specific MIB loading).	Yes. Responses indicated support for MIB II objects.	Yes, both for standard MIB read-write objects and for all private MIB read-write objects tested.	Yes. Agent issued the expected "cold start" Trap message about 0.2 min after power restoral.
Fibermux Corp. Chatsworth, Calif. (818) 709-6000	Crossbow Series FX6602E Hub, SmartLink firmware Version 3.19	2-slot chassis with a 4-port 10Base2 module and 2 10Base-T ports; terminal access via an RS-232 (DB-25) port	Yes. However, agent supports only a single manager address; vendor documentation does not address management of system in a generic SNMP environment.	No. SNMP-standard object support is minimal; effective management requires vendor's private MIB (see chart on vendor-specific MIB loading).	No. Responses indicated agent did not support MIB II objects.	Could not set values for standard MIB read-write objects tested; testing to set vendor's private read-write objects was inconclusive.	Yes. Agent issued the expected "cold start" Trap message about 0.1 min after power restoral.
Hewlett-Packard Co. Roseville, Calif. (303) 229-3800	HP 28699A EtherTwist Hub Plus/48, firmware Version C.1.1	Fixed-configuration hub with 1 AUI, 1 10Base2 and 48 10Base-T ports; console/terminal access via RS-232 (DB-25) port	Yes, except for entering the manager's address; vendor's documentation does not discuss this or mention that manager's address cannot be input locally.	Yes. Vendor's implementation of the standard interface-group objects for each port enables hub to be effectively managed via the SNMP MIB II standard.	Yes. Responses indicated support for MIB II objects.	Yes, for standard MIB read-write objects tested.	Unknown. We were unable to input the manager address (to which Trap messages are sent) in the configuration setup of the agent.
Optical Data Systems, Inc. Richardson, Texas (214) 234-6400	ODS Model 295 chassis, Version 4.33 of ODS Ethernet Network Controller firmware	12-slot chassis with an 8-port 10Base2 and 12-port 10Base-T modules; console/terminal access via an RJ-45 port	Somewhat. Requires proprietary RJ-45 terminal cable; agent supports as many as 8 managers concurrently, but Trap setup is unclear. (Traps did not work.)	No. SNMP-standard object support is minimal; effective management requires vendor's private MIB (see chart on vendor-specific MIB loading).	Partially. Responses indicated some support for MIB II objects.	Most of vendor's private read-write objects tested could be set, but not the standard MIB read-write objects we tested.	No. Neither manager received or recognized the expected "cold start" Trap message within 5 min after power restoral.
Racal InterLan, Inc. Boxborough, Mass. (508) 263-9929	INX 5000-12, INX-NMM software Revision 1.0	12-slot chassis with a 12-port 10Base-T module, 2 10Base2 and 2 AUI ports; console/terminal access via RS-232 (DB-25) port	Somewhat. System and SNMP configuration is unduly complex; however, SNMP documentation is good; supports as many as 8 managers concurrently.	No. SNMP-standard object support is minimal; effective management requires vendor's private MIB (see chart on vendor-specific MIB loading).	Yes. Responses indicated support for MIB II objects.	Yes. Most of vendor's private MIB and standard-MIB read-write objects that were tested could be set.	Yes. Agent issued the expected "cold start" Trap message about 2.6 min after power restoral.
SynOptics Communications, Inc. Santa Clara, Calif. (408) 988-2400	Model 3030 Concentrator, SNMP agent firmware Version 3.3	4-slot chassis with 1 AUI port and 8-port 10Base2 and 12-port 10Base-T modules; console access via RS-232 (DB-9) port	Awkward. SNMP configuration is done on a remote server, then downloaded into concentrator over the network; supports as many as 10 managers concurrently.	No. SNMP-standard object support is minimal; effective management requires vendor's private MIB (see chart on vendor-specific MIB loading).	No. Responses indicated agent did not support MIB II objects.	Yes. Most of vendor's private MIB and standard-MIB read-write objects that were tested could be set.	Concentrator needs reboot from a server if power is interrupted; SNMP management, including Traps, is lost if the server is unavailable.
Timeplex, Inc. Woodcliff Lake, N.J. (201) 391-1111	TIME/LAN 100 FDDI Concentrator*32, software Version 2.1	32-port FDDI concentrator was accessed in test environment through an Ethernet-FDDI bridge	Yes. However, only 1 manager address is currently supported; also, local changes to SNMP configuration require network be brought down to reboot.	No. SNMP-standard object support is minimal; effective management requires vendor's private MIB (see chart on vendor-specific MIB loading).	Yes. Responses indicated support for MIB II objects.	Yes. Most of vendor's private MIB and standard-MIB read-write objects that were tested could be set.	Yes. Agent issued the expected "cold start" Trap message about 0.2 min after power restoral.
Xyplex, Inc. Boxborough, Mass. (508) 264-9900	MX3610 10Base-T Hub Controller in MAXserver 4500 chassis, hub software Version 1.0	5-slot chassis with a local bridge, 12-port 10Base-T module and 2 AUI ports; terminal access via RS-232 (RJ-45) port	Yes. Also, different modules in chassis can each have their own SNMP agent; the 10Base-T hub supports as many as 4 managers concurrently.	No. SNMP-standard object support for the hub module tested is minimal; effective management requires vendor's MIB (see chart on vendor-specific MIB loading).	Yes. Responses indicated support for MIB II objects.	Yes. Most of vendor's private MIB and standard-MIB read-write objects that were tested could be set.	Yes. Agent issued the expected "cold start" Trap message about 2.7 min after power restoral.

AUI = Attachment unit interface
FDDI = Fiber Distributed Data Interface
MIB = Management Information Base
SNMP = Simple Network Management Protocol

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

(continued from page 41)

for SNMP management and that two different SNMP management systems we used could readily establish a management connection with each.

Rather, it is the nature of the management data that could be obtained by these managers that raises concerns about the viability of controlling many hubs and concentrators in a generic SNMP environment today.

The 10 tested hub/concentrators were: AT&T Computer Systems' SmartHUB; Cabletron Systems, Inc.'s MultiMedia Access Center-3 (MMAC-3); David Systems, Inc.'s ExpressNet LAN Concentrator; Fibermux Corp.'s Crossbox Hub; Hewlett-Packard Co.'s EtherTwist Hub; Optical Data Systems, Inc.'s ODS Model 295 hub chassis; Racal InterLan, Inc.'s INX 5000; SynOptics Communications, Inc.'s Model 3000 Concentrator; Timeplex, Inc.'s TIME/LAN 100 FDDI Concentrator*32; and Xyplex, Inc.'s MAXserver 4500 chassis with MX3610 Hub Controller (see "The SNMP hub/concentrator contestants," page 49).

Although Bell Labs cohosted this series of tests, AT&T was afforded no special treatment or opportunity to review the findings prior to publication.

How SNMP works

SNMP standards collectively define the format, content and structure of information that can be exchanged between agents and SNMP management systems. The management system communicates with agents running on devices such as hub/concentrators, routers and bridges, and retrieves information from SNMP objects that contain every detail about the device, ranging from the name of the person responsible for a particular node to the number of packets received on an interface.

The current standard directory of objects is called Management Information Base (MIB) II and contains about 200 discrete objects, the majority of which were defined in the earlier MIB I standard.

MIB II is now an Internet Activities Board (IAB) draft standard and is expected to soon reach formal recommended standard status, the next step in the IAB's standards setting process.

As with the previous tests, our objective was to see whether different vendors' SNMP-managed hub/concentrators would work with other vendors' SNMP management systems and how the various SNMP agents performed.

> Although Bell Labs cohosted this test, AT&T was afforded no special treatment.
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Each hub/concentrator's SNMP capabilities were evaluated from three perspectives:

- The scope of SNMP functionality. Criteria included support for MIB II, the ability to write or SET object values and the ability to react to an alarm condition by issuing a standard message, called a Trap, to the manager.
- The sufficiency of the vendor's SNMP implementation for port-by-port configuration management and performance monitoring of the hub/concentrator.
- The compatibility between agents and generic managers of each vendor's private MIB extensions. These are additional managed objects that a particular vendor has uniquely defined and implemented for its equipment. Particularly pertinent to our test was whether each vendor's private MIB extensions could be installed on a generic central-site SNMP management system and their ability to provide additional worthwhile management information.

As part of our test environment, two different SNMP management systems — AT&T Computer Systems' Systems Manager

(continued on page 44)

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Comparison of hub/concentrator vendors' private SNMP MIB extensions

Vendor	Format of private MIB extensions	Loading on HP's OpenView Network Node Manager	Loading on AT&T Systems Manager	Configuration management capabilities	Performance monitoring capabilities	Other notable, helpful management objects	Problems noted
AT&T Computer Systems Morristown, N.J. (800) 247-1212	Single 23K-byte MIB file; RFC 1212 Concise MIB SMI format	Loaded in 5 min; required 2 minor syntax changes unique to HP manager.	Loaded immediately; no changes required.	Effective; closely aligned with IEEE hub-management MIB; coded descriptions of each port in hub.	Extensive hub- and port-level traffic statistics (frames, octets, collisions, errors, etc.).	Source MAC address of last station to access port; elapsed time since last message received on each port.	None.
Cabletron Systems, Inc. Rochester, N.H. (603) 332-9400	Single 97K-byte MIB file; RFC 1212 Concise MIB SMI format	Could not load; duplicated object names appear throughout MIB; duplication of names needs to be corrected.	Could not load; duplicated object names appear throughout MIB; duplication of names needs to be corrected.	The encoding of configuration information in object values is difficult to decipher; none of the private MIB objects could be tested.	System-, board- and port-level statistics appear extensive; however, none of the private MIB objects could be tested.	None of the private MIB objects could be tested.	Vendor's MIB could not be loaded in either of the generic SNMP managers used in the testing.
David Systems, Inc. Sunnyvale, Calif. (408) 720-8000	Single 27K-byte MIB file; RFC 1155 SMI format	Loaded in 5 min; required 2 minor syntax changes unique to HP manager.	Loaded within 30 min; an object name was duplicated with a private object in another vendor's MIB and had to be altered.	Excellent; objects' textual descriptions and values clearly elucidate individual ports, slots and modules.	Comprehensive and very understandable traffic statistics at the overall system, slot/module, and port levels.	1 object permits manager to assign and set a text "port name" to each port, an invaluable tool for management reference.	None.
Fibermux Corp. Chatsworth, Calif. (818) 709-6000	Single MIB file; RFC 1155 SMI format	Loaded in 5 min; several lines of vendor-specific trap definitions had to be deleted.	Loaded within 30 min; as with HP manager, the same vendor-specific trap definitions had to be deleted.	Limited; no objects provide textual descriptions of what the individual hub modules are, or the nature of the Individual ports.	Comprehensive traffic counts and statistics at the overall system, slot/card and port levels.	1 object reports on the peak traffic percentage the hub has experienced since the traffic counter was last initialized.	Several objects that were to provide data on average traffic percent and average frame size instead returned values of 0.
Hewlett-Packard Co. Roseville, Calif. (303) 229-3800	Single MIB file; RFC 1212 Concise MIB SMI format	Loaded immediately; no changes required.	Loaded immediately, however, syntax structure of AT&T manager precluded retrieval of table values without major MIB editing.	Effective; including MAC address of the node attached to each 10Base-T port.	Hub/system-level and individual port-level counts of packet, octet and error traffic statistics.	1 object details whether there is no traffic on a port, or traffic from 1 station or from many stations.	Objects and procedures for configuring traps are awkward and not clearly documented.
Optical Data Systems, Inc. Richardson, Texas (214) 234-6400	Single 71K-byte MIB file; RFC 1155 SMI format	Loaded within 30 min; several syntax problems were diagnosed and corrected.	Loaded within 30 min; the same syntax problems required by the HP manager had to be corrected.	Generally good, especially for port-level configuration data; however, the MIB should allow manager to retrieve trap address value.	Comprehensive and very understandable statistics at the overall system, slot/card and port levels.	Several objects track frame traffic by protocol type; also, objects provide good data on transmitting station addresses.	None.
Racal InterLan, Inc. Boxborough, Mass. (508) 263-9929	Single 34K-byte MIB file; RFC 1155 SMI format	Loaded within 20 min after 6 minor syntax changes required by the HP manager were made.	Loaded within 30 min; no changes needed.	Effective configuration management at slot and port level; some object groups were not yet implemented and, therefore, provided no data.	Traffic statistics at the bus level (a 2-bus system) and at the port level (frames, octets, collisions, etc.).	Data is reported only on slots actually occupied in the chassis, which limits excessive amounts of worthless SNMP data.	Some erroneous readings were traced to a faulty management module; when this was replaced, the problem was eliminated.
SynOptics Communications, Inc. Santa Clara, Calif. (408) 988-2400	Single 47K-byte MIB file; RFC 1155 SMI format (new version uses RFC 1212 Concise SMI format)	Loaded in 5 min; required 1 minor syntax change.	Loaded within 30 min; no changes needed.	Effective; incorporates IEEE hub-management MIB; good descriptive breakdown by chassis, slot/board and port.	Traffic statistics for whole system, as well as by board and by port.	Objects are included that easily permit manager to determine which ports are active and which are unused and available.	Agent returned no data for several of the objects tested.
Timeplex, Inc. Woodcliff Lake, N.J. (201) 391-1111	Single 108K-byte MIB file; included older Unisys MIB and more recent TL1 MIB; RFC 1155 format	Loaded immediately; only the older Unisys MIB objects were tested (the hub agent did not support the newer TL1 MIB).	Loaded within 30 min; 1 minor syntax change required; only the Unisys portion of the MIB could be tested.	The portion of the MIB tested, which is being discontinued, supported limited configuration-management functionality.	Limited traffic statistics and measurement	Some objects enabled SNMP retrieval of data relating to SMT management of FDDI LAN.	The Unisys portion of MIB, which was tested, is being phased out and replaced with the TL1 MIB portion later this year.
Xyplex, Inc. Boxborough, Mass. (508) 264-9900	8 discrete MIB modules, ranging in size from 4K to 36K bytes; all in RFC 1155 SMI format	3 modules related to Ethernet hub management were selected; all loaded immediately and were reassembled by manager into a single MIB.	Same 3 modules loaded within 30 min; 1 minor syntax change required.	Effective; closely aligned with IEEE hub-management MIB; descriptions of chassis and each port in hub.	Port-level traffic statistics (bit error rate, collisions, frame traffic, errors); no octet traffic counts, however.	Source MAC address of last station to access port, objects are included that permit manager to set a "readable frames" count per port and text "port name" per port.	Some functional duplication of objects; private MIB documentation could be more detailed.

MAC = Media access control
MIB = Management Information Base
RFC = Request for comment
SMI = Structure of Management Information
SMT = Station management technology
SNMP = Simple Network Management Protocol

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

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and HP's OpenView Network Node Manager 2.0 — were used; both managers performed the entire battery of tests separately. We used two managers to ensure any anomalies noted in the SNMP agents' responses to the management systems' queries were indeed caused by the agent and not by the management systems' misinterpretation of response messages.

Setup and testing

All the hub/concentrators tested were configured with at least two active ports. Two different active ports were configured to see if the managers could obtain a clear picture of the hub/concentrator's true configuration via SNMP. The SNMP management systems and other test devices were attached to a thinwire Ethernet segment that plugged into a 10Base2 port, the first of the two active ports. This was the primary access route to the hub's SNMP agent (see graphic, page 46). Where a hub or concentrator did not support a 10Base2 port, a transceiver/converter was used on an available attachment unit interface (AUI) port. Most hub/concentrators offer at least one such port, which is generally used to link the hub to a backbone Ethernet LAN.

> Nine of 10 hub/concentrators provided only rudimentary support for MIB I or MIB II.
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The other port linked each hub to an Ethernet segment to which an AT&T hub was also attached in order to act as a far end node. In most cases, tested hubs were linked to the AT&T hub via an unshielded twisted-pair 10Base-T Ethernet segment. If the tested device didn't support 10Base-T, then this connection was achieved via an AUI cable or a 10Base2 LAN segment. Connecting all tested hubs to the AT&T hub was done in order to ensure that the second port was indeed properly connected and active.

Prior to any testing, we monitored the network to ensure there was no spurious background traffic that could have skewed the test results. Also, as a final check of link continuity and proper hub repeater functioning, one of the management systems would issue an Internet Control Message Protocol ping request, first to the AT&T hub acting as the far end node that also contained an SNMP agent, then to the agent of the hub/concentrator about to be tested.

The ping request permits a manager to direct a single "Are you there?" message to a node or device. If a response is received within the typical brief time-out period, the manager can quickly learn whether that node is alive and whether a clear network route to the node is available.

Standard MIB object support

With this accomplished, we began testing and found that nine of the 10 hub/concentrators provided only rudimentary support for MIB I or MIB II. HP was the only vendor that provided reasonably complete support.

To permit effective management via the standard SNMP objects, we thought that the hub/

concentrator needed, at a minimum, to implement the objects of the System group and some of the Interface group on a port-by-port basis. System and Interface groups are two of 10 sets of objects defined in MIB II. Some groups are optional, but these are mandatory in all SNMP agents.

The System group contains a half-dozen items, providing mainly textual information that generally describes the controlled system to the manager. The Interface group includes about 20 objects that describe each of the node's interfaces, plus provides numeric statistics for network traffic activity on each interface.

All the hub/concentrators in the test implemented the System group of objects. About half — including the David Systems, HP, Racal InterLan, Timeplex and Xyplex products — supported the more complete System group defined in MIB II. The rest supported the older, more limited MIB I System group.

However, as shown in the chart on page 42, HP was the only vendor that implemented what could be termed as a reasonably complete set of the standard MIB objects for managing all 50 ports on its EtherTwist Hub. This implementation enabled the SNMP management systems to ascertain such information as the number of ports on the hub and whether those ports were active.

HP implemented the Interface group for each of the ports on its hub. Except for AT&T, all the other hubs implemented some abbreviated portion of the Interface group but not for each port.

Typically, the agents would report data on a single, unspecified interface for the entire hub.

> It was often hard to tell exactly what some vendors' Interface group objects were supposed to be monitoring.
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Only through repeated querying and testing were we able to determine with reasonable certainty what the device's SNMP agent was reporting in relation to the actual configuration of the tested system.

From our test results, it appeared AT&T chose not to implement any portions of the Interface group for its SmartHUB even though implementation of the Interface group is mandatory in the current SNMP standards. Based on this, users might legitimately question whether AT&T's hub really is SNMP-manageable.

It was often hard to tell exactly what the other vendors' Interface group objects were supposed to be monitoring. In most cases, it appeared that the "interface" being described was what the agent saw by observing the activity on the hub's backplane or bus.

In a few cases, the statistics for this single interface reflected all traffic traversing the hub's bus or backplane, which provided some useful data to a remote manager. Usually, however, only the SNMP management traffic that the hub's agent had received or issued was reported, which had little management value.

Other than HP, the limited Interface information the hub/concentrators reported (none in the case of AT&T) was insufficient, in our opinion, to effectively manage these systems.

There is some controversy within the embryonic SNMP community over whether a strict interpretation of the standards means that the Interface group of objects can be applied to the ports on a hub or concentrator. Clearly, most vendors don't believe that it can, but HP does. Based on our testing, we saw no reason why the Interface group of standard objects could not be used effectively to represent and manage ports on a hub.

> We saw no reason why the Interface group of standard objects could not be used effectively.
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Except for the HP product, all the other hub/concentrators tested relied on their private vendor-specific extensions to MIB II in order to perform most management functions on their hub/concentrators.

Private extension problems

The private MIB extensions the vendors submitted ranged from rudimentary to extremely sophisticated. In most cases, the objects in these private MIBs were ade-

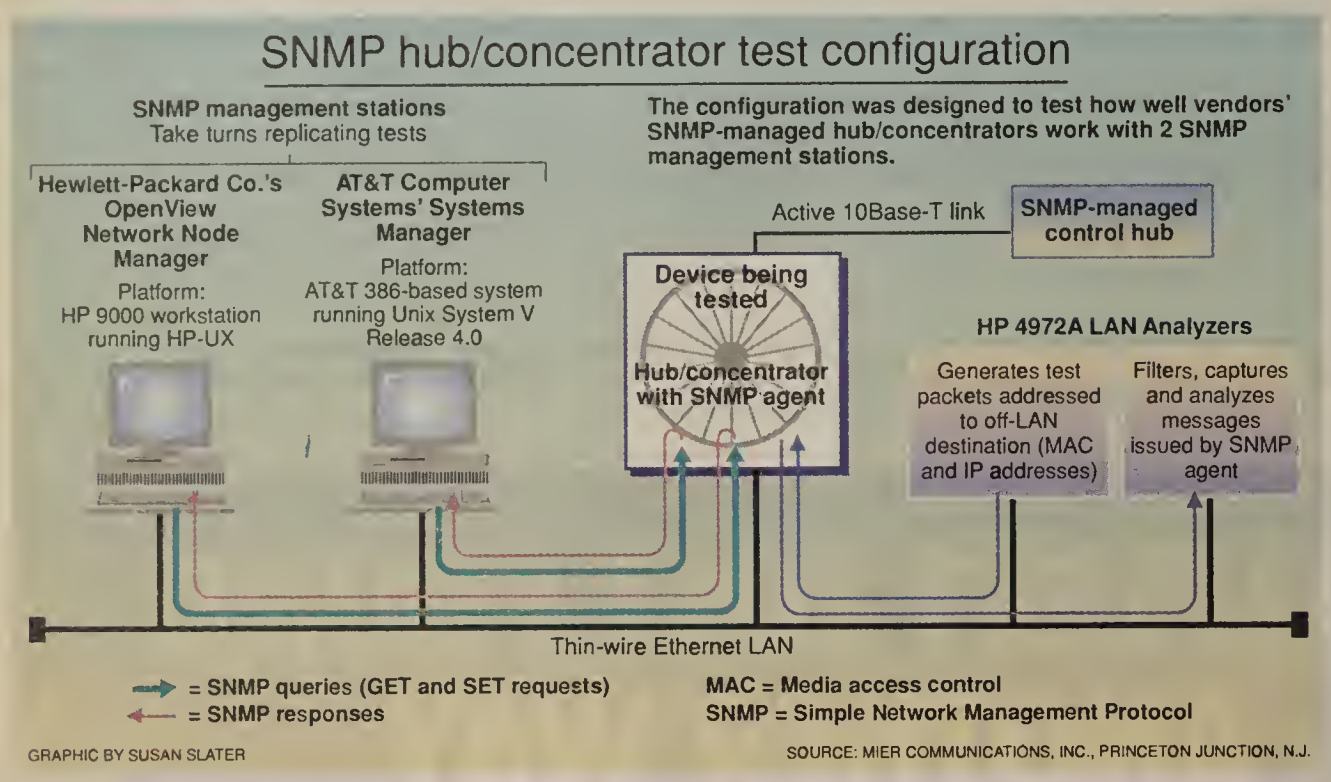
(continued on page 46)

(continued from page 45)
quate for port-by-port configuration management and performance monitoring, provided the vendor's private MIB could be installed on the generic SNMP management system.

The ability for a user to install a private MIB on an SNMP management station is an absolute prerequisite for obtaining the data these unique objects manage. Alternatively, the user must ensure that the vendor of the SNMP management system has preinstalled the particular hub vendor's private MIB.

As the tests revealed, if the hub vendor's private MIB can't be installed into the SNMP management system being used, the SNMP manageability of the hub is virtually nil. And that is exactly what happened with Cabletron's MMAC-3 hub.

Almost all of Cabletron's SNMP management capabilities rely on objects in its extensive private MIB, one of the largest private MIBs we encountered. For a brief assessment of each hub vendor's private MIB and the results of our attempts to install these into the generic SNMP managers we used, see the chart on page 44.



However, Cabletron uses duplicated object names in different parts, or subtrees, of its MIB. This practice is discouraged by most SNMP experts and management system manufacturers in the SNMP community and has been avoided by the other vendors whose MIBs we perused.

Object name duplication imposes logical complications, which prevented either of the two generic management systems we used from compiling or installing the Cabletron MIB. And with the manager unable to understand or query the private MIB objects, none of the valuable private MIB management data the MMAC-3's SNMP agent was collecting could be retrieved.

Many of the hub/concentrator vendors have structured their private MIBs according to a draft IEEE MIB standard that was designed especially for hub management.

It is likely that this increasingly popular MIB, or at least salient parts of it, will be formally incorporated into the repertoire of standard SNMP objects by next year (see "Coming soon: SNMP standard for hub management," page 47).

Until standard MIB objects for hub management are adopted, SNMP users face three choices. They can wait until next year when the Internet Engineering Task Force, which sets SNMP standards, is expected to have established any new objects from the IEEE hub management specification.

SNMP users currently face three choices.

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Alternatively, users may limit their selection of SNMP management systems to those that support the private MIBs of specific hub/concentrator vendors. This should not be a consideration in buying or rejecting an SNMP manager. Limitations where specific

managers support only the devices of other specific vendors runs contrary to the overall design and universality goals of SNMP.

Lastly, users could choose only hub/concentrator vendors whose devices can be managed via MIB II. This may also be impractical at the current time, however. Of all the hubs we tested, only HP met this qualification.

Several other aspects of SNMP manageability were examined in our hub/concentrator test, although many of these might seem of secondary importance to the standard MIB vs. private MIB issue.

While HP is to be lauded for its comprehensive support of standard SNMP objects, its hub SNMP management was not without fault, especially regarding issuance of Trap messages. Traps are unsolicited SNMP messages that agents are required to issue when certain conditions change status.

There was no way for the user configuring a local HP hub's agent to define the manager's address. The agent, therefore, didn't know where to send Traps.

(continued on page 49)

Coming soon: SNMP standard for hub management

Bridges and routers, our lab tests have shown, can be effectively managed by using the current set of standard Simple Network Management Protocol (SNMP) objects embodied in Management Information Base (MIB) II.

But local-area network hubs and concentrators are slightly different network entities. Most hubs function as simple repeaters.

Thus, they operate at Layer 1 of the Open System Interconnection model and are logically different from the network-addressable interfaces of bridges (Layer 2) and routers (Layers 2 and 3).

Many hub/concentrator vendors claim this difference in layers bars their products from applying the current battery of standard SNMP objects to their multiport hub repeaters.

As a result, management of most SNMP-based hubs and concentrators today depends almost entirely on SNMP structured, but vendor-specific, extensions to the standard SNMP objects.

But there may be a solution. A collection of standard objects exists that is oriented specifically toward managing hub-type devices.

From IEEE to IETF?

Unfortunately, this MIB is an IEEE draft standard, one that hasn't yet been embraced by the Internet Engineering Task Force (IETF), the standards-setting group that represents the SNMP community.

Therefore, the management objects contained in the IEEE hub specification have not been incorporated into the current set of standard SNMP objects.

Although formal acceptance has not taken place, the IEEE's MIB still seems ready to be embraced.

Formally known as the "IEEE Draft Standard P802.3K, Layer Management for Hub Devices," this hub MIB has already been implemented in standard SNMP MIB format and has been adopted in individually customized forms as the basis for the vendor-specific MIB extensions used in several of the hub/concentrators we tested.

The SNMP community is working on addressing the issue of hub management. It seems likely that some additions to the SNMP standard objects, designed expressly for hub management, will be unveiled and perhaps even formally adopted within the next 12 months.

Early in July, a new working group within the IETF was established to expeditiously "produce a document describing MIB objects for use in managing Ethernet-like hubs," according to the group's charter.

The charter also stipulates that any new MIB object definitions, "wherever feasible, be semantically consistent with the managed objects defined in the IEEE draft."

The group's goal is the approval and advancement to draft SNMP-standard status of an SNMP-standard hub management MIB at the IETF meeting in November.

On July 22, a draft set of hub management MIB objects was proposed as a new, experimental addition to the standard SNMP MIB.

This document, authored by SNMP technical experts at SynOptics Communications, Inc. and Hughes LAN Systems, is likely to serve as the basis for the forthcoming standard hub management objects.

When this MIB is advanced to the status of an Internet draft standard, hub/concentrator vendors are expected to incorporate support for these new common objects into their systems' SNMP agents.

And vendors of SNMP management stations will likewise add support for these new, standard hub management objects, which are likely to end up as part of MIB III.

— Edwin Mier

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(continued from page 47)
HP requires a remote management system to input manager system addresses via the objects that HP has defined in its private MIB. This means that the hub cannot be properly configured for SNMP until the vendor's private MIB has been successfully installed on a management system that can then establish an SNMP connection with the hub.

Xyplex takes a noteworthy approach to MIB design.

▲▲▲

The two charts summarize many of the operational anomalies we discovered in testing.

For instance, we found that some of the hub/concentrator vendors had problems with SET operations, where a manager remotely endeavors to change the values of specific object variables.

In these cases, the device either responded with an error message or acknowledged the SET attempt. But when we issued subsequent GET requests to retrieve data, we realized that the value we attempted to change had remained the same.

In other cases, some agents did not respond to some of the vendor's private MIB objects we tested, although the objects appeared to be relevant to the management of hub-type devices. This is not an uncommon situation with private MIBs because some vendors consolidate a wide range of objects for managing a spectrum of different network products into a single private MIB file.

Individual agents, on the other hand, usually support only the objects appropriate to the device on which they are running. Bridges, for example, don't generally support objects related to network-layer protocols, whereas routers generally do.

Xyplex takes a particularly noteworthy approach to private MIB design. Rather than having a single massive file containing all of its private MIB objects, Xyplex segregated its private MIB into modules, each oriented toward management of different types of network devices it sells, including bridges, hubs and terminal servers. We selected three of the eight modules Xyplex provided and installed each in both management systems.

We did not know what would happen, but this procedure worked surprisingly well. After all three MIB modules were successfully installed, both managers automatically reassembled the modules into a single private MIB that was customized to our particular requirements.

As SNMP proliferates and as more types of network devices become SNMP-manageable, this modular, customized approach to private MIB distribution clearly seems to be the way vendors should proceed in the future. Users would thus be able to install only the portions of the private MIB they require and not have to tax their management resources by processing objects that do not apply to their configuration.

As for employing SNMP to manage hubs and concentrators, users either put up with these MIB extensions today or wait for standard hub and concentrator management objects to come out in what is expected to be MIB III.

Need more details on Simple Network Management Protocol (SNMP) or our test results?

Two in-depth special reports are currently available that detail current and draft SNMP standards, private extensions to the SNMP objects, directories and comparisons of SNMP-manageable network products and SNMP management systems.

They also contain full results of the SNMP interoperability laboratory tests to date.

One report is oriented toward user organizations that are planning or deploying SNMP in their enterprisewide networks. The second is designed for implementers and developers of SNMP-manageable devices and systems.

For more information on either report, contact Mier Communications, Inc. at (609) 275-7311.

The SNMP hub/concentrator contestants

This phase of the *Network World*/AT&T Bell Laboratories test examined the following 10 hubs and concentrators:

■ The **SmartHUB** from AT&T Computer Systems of Morristown, N.J. This is a fixed-configuration desktop hub with 12 10Base-T ports. Version 9.5 of the SmartHUB's firmware, containing the Simple Network Management Protocol (SNMP) agent, was run.

The HP 28699A is a fixed-configuration desktop unit supporting 48 10Base-T ports.

▲▲▲

■ The **MultiMedia Access Center-3 (MMAC-3),** a three-slot concentrator chassis from Cabletron Systems, Inc. of Rochester, N.H. The chassis contained one 12-port 10Base2 module and another module with eight standard Ethernet attachment unit interface ports. Software Version 1.0, containing Cabletron's SNMP agent, was run.

■ The **ExpressNet LAN Intelligent Concentrator** from David Systems, Inc. of Sunnyvale, Calif. The five-slot chassis contained a 12-port 10Base-T module.

The supervisor module (occupying another slot in the chassis) ran firmware Revision 3.0, which contains David Systems' SNMP agent.

■ The **Crossbow Series FX6602E Hub,** a two-slot chassis from Fibermux Corp. of Chatsworth, Calif. The unit contained a four-port 10Base2 module and the vendor's SmartLink management module, which ran firmware Version 3.19.

■ The **HP 28699A EtherTwist Hub Plus/48** from Hewlett-Packard Co. of Roseville, Calif. This is a fixed-configuration desktop unit supporting 48 10Base-T ports via four 50-pin telephone company-type cable connectors.

The SNMP agent tested was contained in Version C.1.1 of the vendor's firmware.

■ The **ODS Model 295,** a 12-slot concentrator chassis from Optical Data Systems, Inc. of Richardson, Texas. The system was configured with an eight-port 10Base2 module, a 12-port 10Base-T module and an ODS Ethernet Network Controller module running firmware Version 4.33.

■ The **INX 5000-12,** a 12-slot concentrator chassis from Racal InterLan, Inc. of Boxborough, Mass. The system contained a 12-port 10Base-T module along with the vendor's Network Management Module, which ran software Revision 1.0.

■ The **Model 3030 Concentrator,** a four-slot chassis from SynOptics Communications, Inc. of Santa Clara, Calif. Besides the vendor's Ethernet Network Management module running Version 3.3 of SynOptics SNMP agent firmware, the unit was configured with an eight-port 10Base2 module and a 12-port 10Base-T module.

■ The **TIME/LAN 100 FDDI Concentrator*32** from Timeplex, Inc. of Woodcliff Lake, N.J. This unit provides 32 Fiber Distributed Data Interface local-area network ports. Since we needed to access the test device's SNMP agent via an Ethernet, an Ethernet-to-FDDI bridge (one of the vendor's TIME/LAN 100 bridge/routers) was used to establish the connection to the FDDI concentrator. The SNMP agent was contained in software Version 2.1.

■ The **MAXserver 4500,** a five-slot chassis from Xyplex, Inc. of Boxborough, Mass. This unit was configured with a 12-port MX3610 10Base-T Hub Controller and a bridge module. Different modules can contain their own SNMP agent with Xyplex's configuration. We subsequently tested just the 10Base-T hub SNMP agent, which was based on Version 1.0 of the vendor's software.

The TIME/LAN 100 provides 32 Fiber Distributed Data Interface LAN ports.

▲▲▲

Other hub and concentrator vendors that had indicated they planned SNMP support for their systems — including Chipcom Corp., Gandalf Data, Inc., Networth, Inc. and Synernetics, Inc. — were invited to participate in this test phase but declined for various reasons.

— Edwin Mier

Letters

continued from page 33
no remuneration from AT&T. The same cannot be said of any rebiller.

Robert Schieb
Chief executive officer
Global Long Distance Marketing
Tamarac, Fla.

Edward Horrell's recent opinion article "Beating aggregators at their own game" (*NW,* July 29) contained misinformation.

The most glaring misstatement of fact is that the "individual members," or end users, of an AT&T Software-Defined Network (SDN) are responsible for the total traffic volumes delivered to AT&T. In fact, the aggregator or reseller is solely responsible for meeting the volume commitments of any particular SDN plan.

Because the end user's rates are fixed by the aggregator/reseller (typically at or near SDN base rates), only the aggregator/reseller's gross margin (in the form of discounts received from AT&T) is affected by the volume of traffic. Any penalties for failure to meet guaranteed usage levels are solely the responsibility of the aggregator/reseller.

I also disagree with the opinion on the effect AT&T's Distributed Network Services (DNS) offering will have on the future of aggregator/resellers:

■ Currently, the dollar volume of traffic aggregated under other AT&T offerings is far greater than aggregated/resold SDN volumes and is totally unaffected by the DNS offering.

■ DNS has no effect on an existing SDN aggregator/reseller's ability to continue to provision customers into his SDN. It simply is an alternative to SDN that promises 10-day provisioning — vs. 90 to 120 days with SDN — in exchange for a 15% to 20% reduction in maximum discount rates.

■ DNS does not, as yet, offer dedicated access, and for that and other reasons, most current SDN resellers who do subscribe to DNS will maintain their SDN and use DNS as a "parking place" while awaiting SDN provisioning.

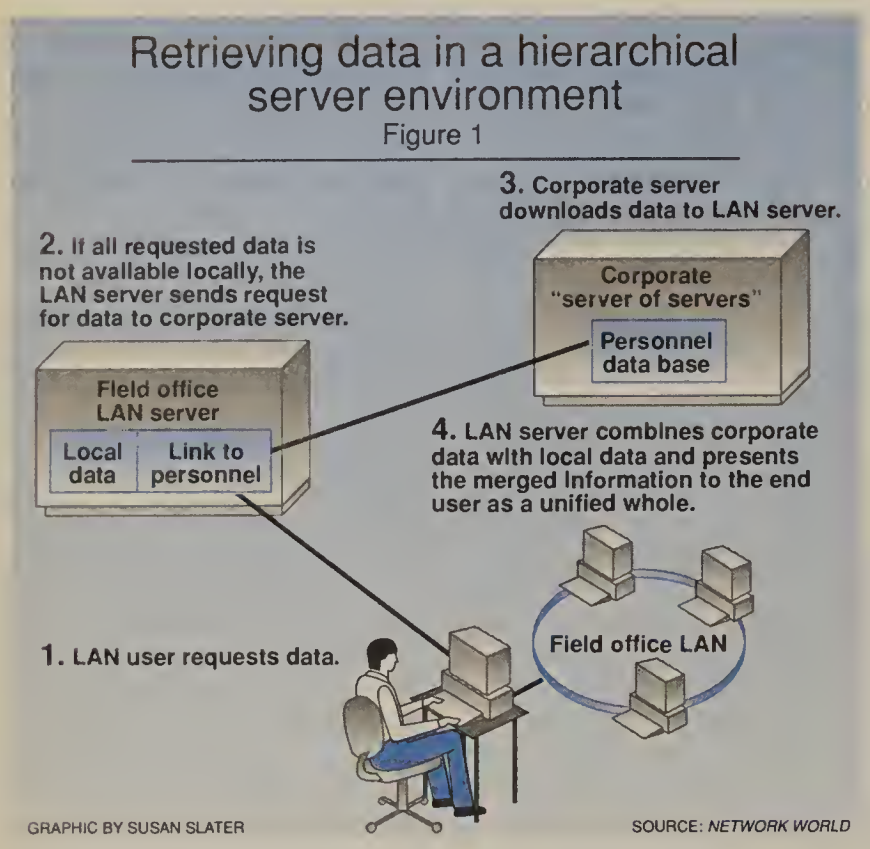
Gerald Pfleger
President
Mid-Com, Inc.
Cleveland

Author's response: By definition, aggregators do not rebill. In this regard, a great deal of confusion exists when categorizing companies in the long-distance business. I agree with Mr. Schieb's definitions as well as his comments.

Regarding Mr. Pfleger's letter, my column does not state that SDN resellers are not responsible for traffic to the carrier (AT&T); my statement referred to aggregators in the strictest use of the term. Unfortunately for rebillers, the word aggregator has been broadly used in the industry to include rebillers, as well as aggregators and some resellers. It was in this context that the column made reference.

However, semantics notwithstanding, I stand by my position that AT&T has created an industry that it would like to see disappear, and the introduction of DNS is the beginning of the end.

Edward Horrell
President
The Horrell Consulting Firm, Inc.
Memphis, Tenn.



LAN internetworking

continued from page 40

server installations.

"This central point of control provides a more effective approach to servicing user needs than is possible with a multitude of independently managed servers," Hanss says.

"Despite the movement to computing on the desktop, there still is a need for strong central provision and support of services," he continues. "It is important that we provide the information sharing and support benefits of central time sharing with the ease of use and flexibility of the desktop workstation."

The Institutional File System is commercially available from the University of Michigan. Cost depends on the size and configuration of the network. Support for IBM 3090 central file servers running MVS/ESA, AIX/370 or VM is available now, as is support for intermediate caching servers based on the IBM RT Personal Computer.

Client support is available for MS-DOS, Macintosh and Unix personal computers and workstations.

Matrix model

Unlike the hierarchical model, the matrix model does not involve a server of servers. Instead, each personal computer or workstation on the LAN can connect to multiple, specialized LAN servers as needed to obtain the information requested by the end user. The workstation merges data from the server data bases with its own local data and presents the composite information to the end user as a unified whole (see Figure 2, this page).

Each local server provides a specific service, such as an SQL-accessible data base, user authentication, facsimile, electronic mail or distributed application.

Each LAN has whatever collection of specialized servers required to support local users as well as servers responsible for managing connections to servers located outside the LAN. A server may be administered either by the department that owns the data or by a central organization that specializes in net operations.

The personal computers or workstations on the LAN must be programmed to know where to find each necessary service. They also must know the access codes and have the software to access each service. As in the hierarchical approach, the process by which the workstation accesses the service is transparent to the end user.

The matrix model can be difficult to manage properly, especially when many workstations and servers are involved.

"The software tools to manage this type of system are just starting to be developed," says Marty Vernick, manager of IBM's Client/Server Technical Office. "How do you ensure that proper backups are taken? Is access to mission-critical data being controlled properly?"

Lynn Berg, manager of DEC's Client/Server Computing Program, notes that matrix systems management tools are available and functional for systems based on a single computer architecture.

"Digital's Enterprise Management Architecture has been designed to manage systems and networks from multiple vendors, but tools for multiple architectures are still evolving," she says. "Some work is going on between individual vendors to solve this problem, but broad availability will probably require industry standards such as those proposed as part of the OSF's Distributed Management Environment."

Howard Niden, senior manager and director of open and relational systems at the Chicago office of New York-based Price Waterhouse, also sees DME as a solution for potential matrix model management problems.

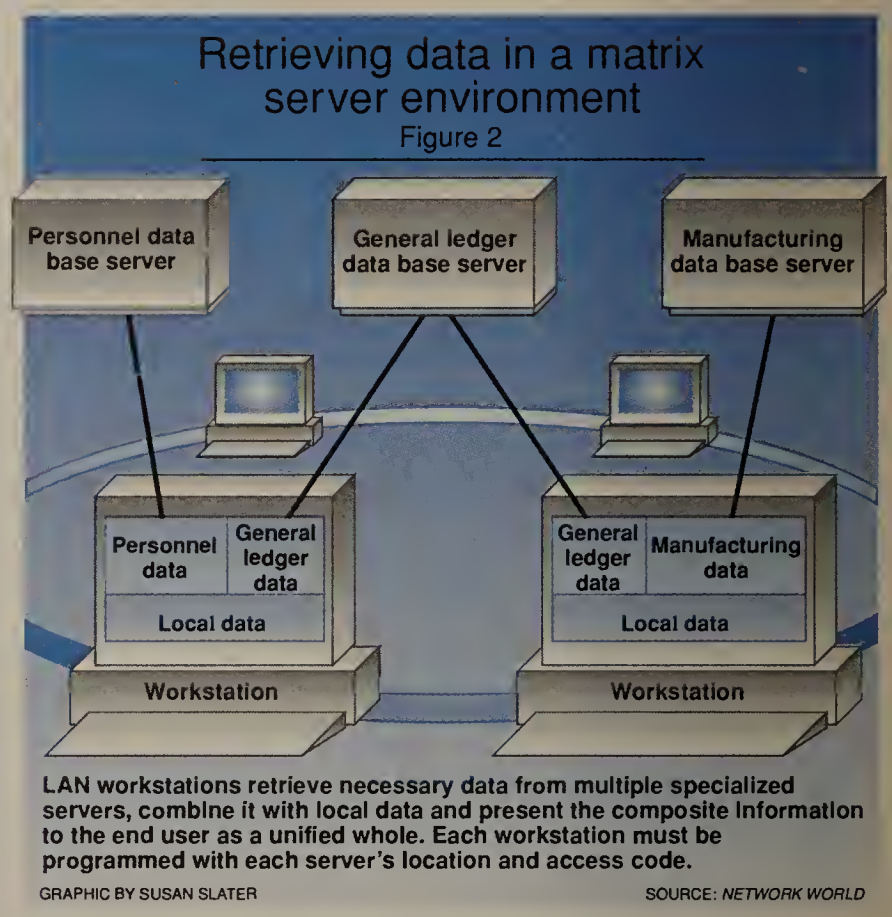
"I fully agree that the OSF's DME is the only hope for managing multiarchitecture internetworked server systems," he says. "Even with the DME standards, a tremendous amount of work remains to be done by all server vendors."

An example of the matrix model is the Massachusetts Institute of Technology's Project Athena, which concluded development efforts in June. This eight-year project, supported jointly by DEC and IBM, implemented a matrix architecture with hundreds of servers supporting thousands of workstations. Servers and workstations were owned and used by departments throughout MIT but managed centrally by a handful of technical experts using sophisticated software tools (see "A server internetwork in action," this page).

Despite the management difficulties they present, matrix architectures provide significant advantages to companies with sufficient expertise. For instance, Berg says, "Matrix systems are inherently more flexible. They can be designed to appear [logically] either as a hierarchical or matrix system, while a hierarchical system cannot be made to look like a matrix."

She gives the example of an international financial services company, which requested anonymity, that has implemented a matrix architecture that appears to the user as a hierarchical architecture. Data is entered centrally, and the system is managed centrally.

The interesting thing about this architecture, Berg notes, is that the "central" location shifts among the company's sites in New York, London and Tokyo, depending on the time of day. In this way, management operations are continually moving to the area of highest traffic. However, the users, no matter where



LAN workstations retrieve necessary data from multiple specialized servers, combine it with local data and present the composite information to the end user as a unified whole. Each workstation must be programmed with each server's location and access code.

GRAPHIC BY SUSAN SLATER SOURCE: *NETWORK WORLD*

A server internetwork in action

One of the notable testing projects for intelligent internetworking has just come to a close. But its results go marching on.

Project Athena, an eight-year development effort at the Massachusetts Institute of Technology that was backed by Digital Equipment Corp. and IBM, is famous for creating the X Window System windowing/graphical user interface.

But in networking, Project Athena may, in time, become even more famous for its early research into servers, server software, specialized servers, and matrices and hierarchies of servers.

The actual project ended in June, but its network is still in operation at MIT, with several hundred servers supporting thousands of workstations located throughout the campus. The servers and workstations are part of MIT's extensive series of Ethernet networks, which are interconnected via a high-speed fiber-optic backbone.

Athena uses specialized servers to provide services such as distributed print queues (the Palladium system), security and user authentication (the Kerberos system), object naming (the Hesiod system), file and disk sharing (Remote Virtual Disk, Network File System, Andrew File System) and a real-time notification service (the Zephyr system) that informs users of such events as server outages.

The entire internetwork of servers and workstations is centrally managed by about a dozen computer specialists using the Service Management System (SMS), a data base of user, workstation and server information. To change a server configuration, an administrator simply changes that server's entry in the SMS. Automated management tools then ensure the server's configuration matches the one listed in the SMS.

Management is based on a hierarchical server model, with redundant servers providing backup for critical net services. To locate a needed service, the user's workstation queries the Hesiod naming service for the nearest server providing that service. The workstation then requests authorization from the Kerberos system to access that service.

Kerberos checks a central data base of user authorizations, and if the user of that workstation is permitted to access that service, it gives the workstation a cryptographic "ticket" that tells the server to grant access to a particular service. The ticket is then verified by the server, and service access is granted. This entire process is transparent to the user.

Meanwhile, Project Athena's information services are based on a matrix server model. For example, if a workstation user wants to share a new laser printer with others on the network, that person registers the availability of the printer with one of Athena's network administrators and specifies which users are to be granted access.

The administrator makes a change to the SMS data base, which causes any necessary server software to be automatically downloaded and installed on the specified workstations. The laser printer's availability is then announced by the Hesiod system.

This past June, DEC introduced the first commercially available implementation of Project Athena software. The package, DECathena Services, provides central management for networked Unix workstations ("DEC unveils mgmt. pack for Unix nets," *NW,* June 17).

IBM continues to study the results of Project Athena. Portions of it are available on the RISC System/6000 AIX system, but no plans for its integration into other IBM products have been announced. It is interesting to note, however, that Ronald Orcutt, who was executive director of Project Athena, recently accepted a research position at IBM.

— Lloyd Taylor

they are located, see a single system.

In addition, Berg says, this arrangement provides for backup capability within the company itself by allowing operations to be moved instantly to one of the other main sites should a failure occur.

Price Waterhouse's Niden has some concerns about DEC's traditional approach, however. "The DECnet-based server systems sold by DEC do not use Athena technology," he says. "They are much more expensive to implement. I foresee that people will have difficulty in justifying the DECnet-based [server] approach in the long run, vis-a-vis the less expensive Athena-based approach."

The Athena system is based on open systems technology and can take advantage of the strong price competition in the Unix-based server market. The DECnet-based server approach is still largely VAX-based and, therefore, more expensive.

Niden also believes IBM has price problems. "IBM can implement peer-to-peer internetworked server systems but typically at a higher cost than other vendors," he says. "IBM's solutions are generally of high quality but simply cost more than other approaches."

Internetworking challenges

There are many challenges to overcome in using servers as a LAN internetworking strategy. While many of these challenges will be technical, the most difficult will likely be political and economic.

There'll be significant costs in just preparing today's workstations to operate in the new environment, according to Berg.

Management of internetworked server systems is critical, no matter what architecture is used. As Vernick warns, "Don't distribute what you cannot manage."

Also, security for access control and data confidentiality will become more important and difficult as data and applications become more widely distributed. Lack of common security methods may slow acceptance of distributed systems because firms must be cautious about control of mission-critical and sensitive data.

"The servers must be located in physically protected computer room-like environments to ensure their safety," Vernick says. "Access to the server, either physically or via the network, must be carefully controlled."

A major political issue is that the new levels of integration provided by the implementation of internetworked server systems will force MIS staff and LAN administrators to work together much more closely. Users will demand that data be available in user-specified formats whenever and wherever they need access to accomplish their jobs.

Turf battles between MIS staff and LAN administrators may result in both groups becoming irrelevant as users find ways to get at the data without their aid.

In the near term, however, the only hope of implementing any type of internetworked server system is to select a standard set of server software. The limited interoperability among systems from Banyan Systems, Inc., DEC, IBM, Novell, Inc. and others makes it difficult to implement a server internetwork using a heterogeneous collection of their equipment. The emerging OSF standards for DCE and DME will address these limitations.

The situation is not quite as bleak in the distributed data base arena. With the emergence of an ANSI standard for SQL, more and more vendors are moving to a common query language interface for their data base engines.

It remains important to ensure that the various servers use a common network transport protocol, such as TCP/IP or Xerox Corp.'s Xerox Network Services, to allow the SQL clients and servers to communicate.

More than connectivity

Internetworking involves more than just tying together your company's various LANs with bridges, routers and gateways. It involves providing users with the data they need, quickly and efficiently.

A hierarchical server architecture can be implemented now with hardware and software from a variety of vendors. It can be managed relatively easily by experienced staff and provide good network traffic isolation if the intermediate servers are located near the users.

However, flexibility is limited because user personal computers and workstations can access information only from the server directly above them in the hierarchy.

A matrix architecture is certainly more flexible but also more difficult to manage than the hierarchical approach, mainly because tools to support its management and operations are still in the early development stages.

Yet for the company willing to invest the considerable resources necessary to implement such an approach, the matrix architecture can provide a significant strategic advantage by making it easier for end users to access information across the traditional lines of the organizational structure.

As more companies begin to internetwork with their customers, suppliers, financial institutions and other organizations, network managers will be faced with the task of implementing a system that allows sharing of information while still protecting proprietary interests. This level of integration will most likely require a hybrid architecture, one that is part hierarchy and part matrix.

Network professionals with foresight will start thinking about these issues now so that they will be ready when the need arises.

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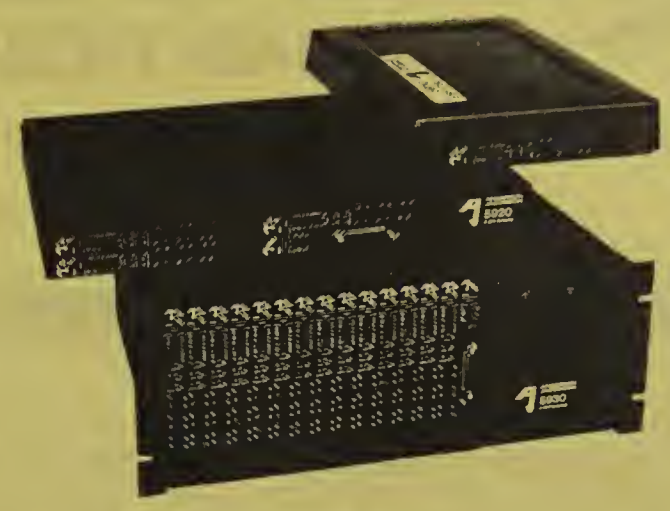

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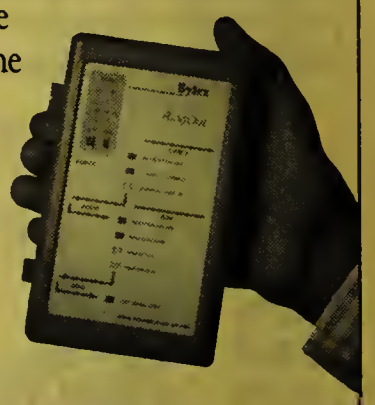

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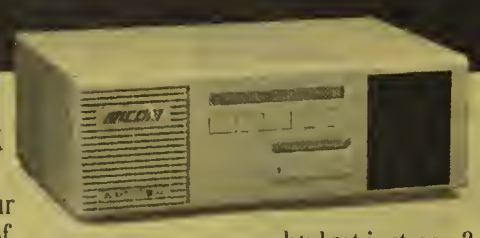

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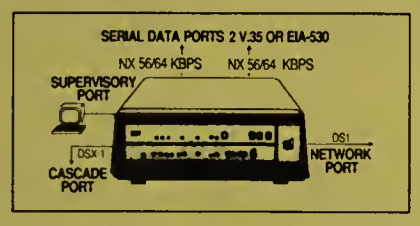

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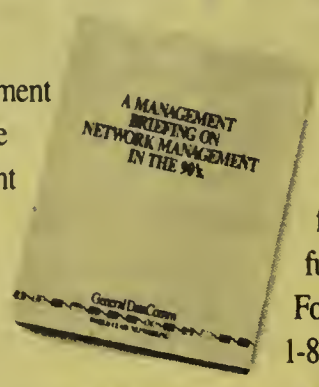

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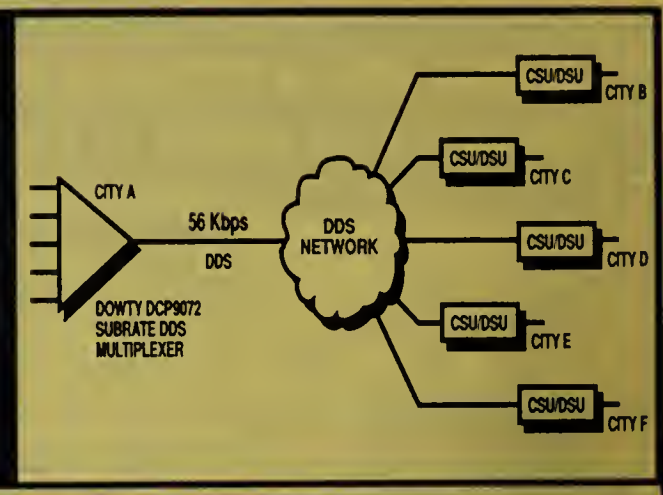

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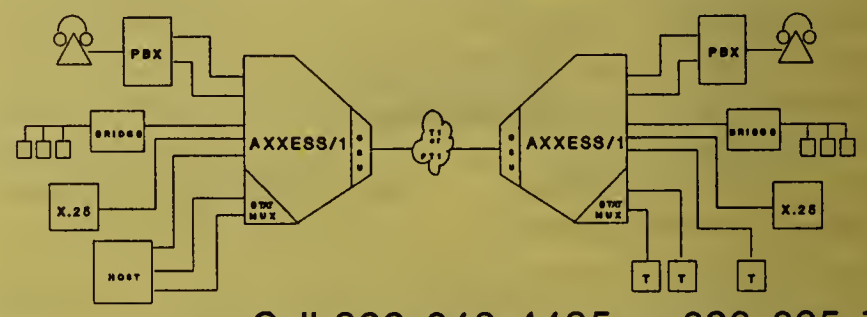

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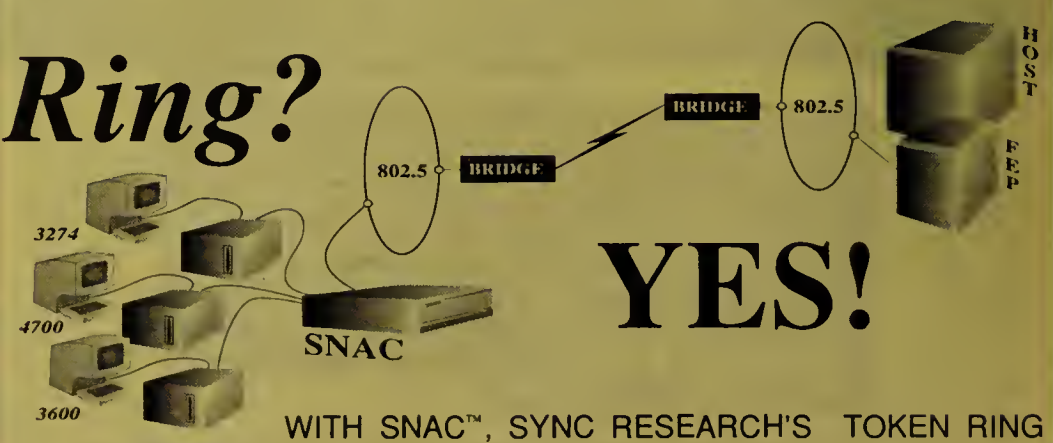

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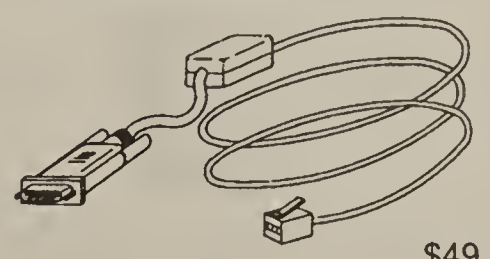

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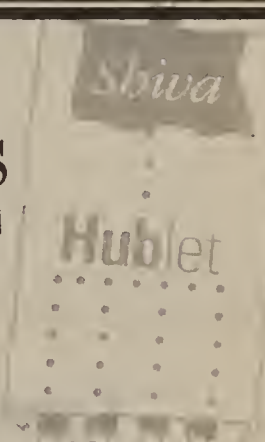
Four reasons to buy Shiva's new 10BaseT Hublet



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Winners of this year's User Excellence Awards will be featured in the November 25 issue of *Network World*. The awards will be presented at the Communication Networks conference in Washington, D.C. in January.

Here's your chance to spotlight your innovative networking efforts and get into the running for the Seventh Annual User Excellence Awards. Please submit a 250- to 500-word abstract explaining how networking has helped your organization achieve its strategic goals.

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Please be sure to include your name, title, address and telephone number. All entries must be submitted by Thursday, Sept. 12.

Get the recognition you deserve for your innovative networking efforts by entering *Network World's* Seventh Annual User Excellence Awards today. Good luck!

Entry Form

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NETWORK WORLD

AUSTEL exec speaks out on competition

continued from page 30

give them a direction to do something, then past experience has been that they have observed our directions. And if they, or indeed, if any carrier was minded not to observe an AUSTEL direction, there's a $10 million (Australian) sanction attached to it, after court proceedings.

You said there are clear provisions against discriminatory pricing. Does that mean carriers will not be able to offer customized network service packages?

No. Those kinds of packages are permitted, provided they can be cost-justified.

Can international resale commence right now between Australia and any other country?

Not immediately. We've issued for consultation and comment what we call a draft-class license to allow it. And one of the issues we raise in there is what conditions need to apply to international resale.

Many countries, such as the U.K., say they will only allow international resale to countries that allow reciprocal access to their network markets. Will Australia do that?

That is one option that is being considered. But it hasn't been determined yet because we're still in the consultative process on that issue.

Some people claim that resellers could lower international calling charges. What's your view on that?

I'm not quarreling with that proposition. But we don't want to throw the baby out with the bathwater and have international carriers doing this, as distinct from individual companies using private networks.

We are searching to get the balance of allowable resale within the Australian scene right. If we don't get it right, there is a potential for Australia to lose the benefits of resale and for international carriers to take advantage of the openness here.

How is it that international carriers could take advantage of that?

Quite frankly, it's something I don't want to go into. I don't want to start teaching international carriers how to take advantage of that sort of system. But let me assure you that they could well do it if we do not get the regulatory regime correct.

Why is Australia waiting until 1997 for full competition?

You've got to remember we've had a monopoly for 90-odd years. This is a phased introduction of competition as well as an orderly introduction of competition. This way, you can at least be assured of one strong competitor.

One criticism of a duopoly is that it is not very effective at delivering lower prices and better service to users. What do you think about that?

If you were a duopolist faced with the fact of competition in 1997, you would be working your butt off, wouldn't you? [You would want] to make sure that you were well placed, or better placed, than any potential entrant in 1997.

Do you think the inception of competition in Australia will make your country more attractive as a hub for global private networks?

All the benefits that competition provides will follow through to that hubbing market.

Bank official reveals net merger lessons

continued from page 26

braced outsourcing fairly aggressively?

There are four reasons why companies outsource. The first two are appropriate, and the last two are dysfunctional. I call these the four s's of outsourcing.

The first s is scale. If your bank is small and doesn't process enough transactions to gain economies of scale, then you might enlist a service bureau.

The next s is specialty. There are certain areas in which service bureaus have specialized, such as credit card and trust processing. Even if you have the right scale, you might use a service bureau for one of these areas because they can do a much better job.

The third s is surrender. You hear bank officers say 'I've been trying to run DP forever and those people don't speak my language, they don't listen to me, and they cost me more money every year.' They give up and bring in someone else to run the operations. Obviously, this is not a healthy reason.

The fourth s is short-term gain. The bank signs a 10-year contract with a large outsourcing firm and immediately reduces DP expenditures. However, although a bank gets a short-term benefit, over the life of the contract, they will probably end up paying very heavily for that short-term gain in years five to 10.

Do you have any particular concerns in the network arena?

I worry about the reliability of networks, whether it's our private lines or the public switched network. I believe we have an old, crumbling infrastructure, and I think land-based lines are very vulnerable, especially in older cities in the Northeast.

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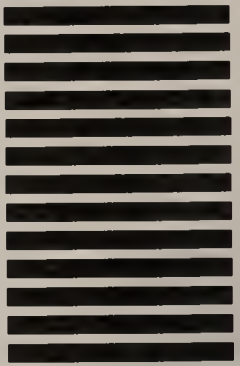

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New switched service devices expected

continued from page 4

analyst at The Yankee Group, a market research firm in Boston.

"There's a real opportunity for the mux vendors to make some hay in this market if they're smart," Dagres said. "Customers, could wind up buying one of these access units with every PictureTel [Corp.] codec or Cisco [Systems, Inc.] router they buy."

The Yankee Group has estimated that the market for switched access customer premises equipment could reach $500 million to $700 million by the mid-1990s.

Newbridge last week became the first established T-1 multiplexer vendor to announce a major foray into the switched access equipment market with its new Transmission Access Processor product line (see "Line of access devices for switched services launched by Newbridge," page 4).

Edward Kennedy, Newbridge's vice-president of product marketing, said the company couldn't ignore the carriers' repositioning of their services to switched offerings or users' changing bandwidth requirements.

"If the '80s were the decade of the private network, then the '90s will be the decade of the public switched hybrid net," he said. Users "feel better about going back to the public switched network."

Timeplex, Inc. unveiled an access product dubbed the ISDN Gateway Server late last year. Bill Kane, director of marketing programs at Timeplex, said he anticipates demand for such products will pick up.

"With AT&T's recent Switched 384 introduction, customers have begun looking at connecting LAN traffic and video traffic using switched services," he said.

David Owen, NET's director of strategic product planning, said his company will probably choose to work with existing vendors in the market rather than develop its own switched access technology.

NET demonstrated a dial backup application at a trade show earlier this year using its gear in conjunction with a Multiband Bandwidth-on-Demand Controller from Ascend, he said. NET intends to deliver switched service access on its Integrated Digital Network Exchange products by the middle of next year.

"All of the major mux vendors are looking at supporting switched services," Owen said. "We're starting to get pressure from user accounts that are trying to run applications over switched services."

The influx of established T-1 multiplexer vendors promises to put pressure on the upstarts that lead the market to cut prices and add features, analysts said.

"We've plowed the snow and cleared a path for other vendors to get into the market," said Tom Miller, vice-president of marketing at Digital Access in Reston, Va. "And even though we've got a good lead on them, customers are going to be asking, 'What have you done for me recently?' "

Preparing for the inevitable entrance of larger competitors into the market, Ascend is teaming up with carriers such as AT&T and MCI Communications Corp., as well as equipment makers such as videoconferencing vendor Compression Labs, Inc.

MFS service to link LANs at FDDI speed

continued from page 1

The services will support the Transmission Control Protocol/Internet Protocol and other popular LAN protocols, Holland said.

The company would not discuss what access service users will need to take advantage of the new services.

MFS is the latest in a growing list of companies, including Infonet Services Corp., Sprint International and Performance Systems International, which offer LAN interconnection services based on bridges and routers in their networks.

MFS will first offer its new services across MFS of Houston, Inc.'s 849-fiber-mile network, which serves 30 buildings in downtown Houston, Holland said.

"We've had tremendous user demand for these services in the Houston area," he said. "There's a heavy concentration of energy firms and medical centers with high-bandwidth metropolitan-area applications."

MFS expects to have at least one, and maybe several, Houston-based users at the announcement here to discuss their plans to use the LAN interconnection services.

MFS plans to offer its new services to users served by its 10 other fiber networks over the next six to 12 months, Holland said. The company operates all-fiber nets in Baltimore, Boston, Chicago, Dallas, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh and San Francisco.

MFS said the services offer more bandwidth than current alternatives.

"When users go to their local telephone company in search of services to link LANs in a metropolitan area, they're presented with a choice of switched 56K bit/sec, T-1 or T-3," said Holland. "We think our services will break that bottleneck."

Analysts say the MFS services will compete with Switched Multimegabit Data Services (SMDS), a switched high-speed digital data service supporting transmission speeds between 1.54M and 155M bit/sec.

Most regional Bell holding companies are conducting or have planned SMDS field trials with customers. Some are expected to begin tariffing the service as early as this fall.

"MFS services certainly respond to a

(continued on page 64)

IBM reveals plan for routers

continued from page 1

IBM's Communication Systems Division here, said the router will enable users to blend IBM's hierarchical SNA traffic with distributed computing and peer communications.

"Our customers are giving serious consideration to multiprotocol routing solutions as LANs increasingly drive new applications and new models of network computing," Fjeld said. "Our router family will fully address these new user requirements."

Favorable reaction

Users applauded IBM's router plans (see "Multiprotocol router stirs user interest," this page). Robin Layland, engineering consultant in network engineering and telecommunications at Hartford, Conn.-based The Travelers Insurance Co., said the move signifies IBM's commitment to internetworking solutions.

"It's a positive step to see IBM committing itself to internetworking and nonhierarchical topologies," Layland said. "The future is in LAN internetworking, and I'm pleased to see IBM embracing this approach."

> "IBM is counting on the demand for APPN to materialize so they can lead the pack."
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Fjeld emphasized, however, that IBM is only prepared at this point to issue a statement of direction. "There's been no shortage of speculation regarding our introduction of a multiprotocol router, so we feel that, short of announcing a product, it's useful to provide a background to customers on what we will and won't be doing," he said.

What the IBM router will not do, Fjeld said, is emulate a PU Type 4 front-end processor and be capable of routing SNA traffic. At least one competitor, Cisco Systems, Inc., has made routing SNA a long-term goal.

Instead, IBM will probably enable customers to support SNA traffic by encapsulating it in Transmission Control Protocol/Internet Protocol, a tack vendors such as Cisco, Proteon, Inc. and Wellfleet Communications, Inc. have taken. IBM said, however, that this is only an option and it has yet to commit to any one method for supporting SNA.

David Passmore, a partner with Ernst & Young's Network Strategies Practice consultancy in Vienna, Va., said IBM's strategy is to promote SNA routing that's exemplified by its Advanced Peer-to-Peer Networking (APPN) rather than focus on the older PU Type 4 subarea SNA system.

APPN defines how devices can communicate as peers, as opposed to the current SNA hierarchical fashion. It also supports dynamic routing as opposed to having every network route predefined, as with the Network Control Program and VTAM.

"IBM will handle SNA traffic by supporting APPN in native mode and support PU Type 4 traffic via encapsulation," Passmore said. "IBM is clearly counting on the demand for APPN to materialize so they can lead the pack."

In addition to its proprietary SNA protocols, IBM plans to support existing protocols such as the Network Basic I/O System, TCP/IP, Novell, Inc.'s Internetwork Packet Exchange (IPX), Digital Equipment Corp.'s DECnet, Apple Computer, Inc.'s AppleTalk, and Xerox Corp.'s Xerox Network Systems as well as emerging Open Systems Interconnection protocols.

The router will support bridging algorithms, such as IBM's own proprietary Source Routing, as well as transparent bridging for Ethernets and Source Routing Transparent bridging. It will also support the Open Shortest Path First routing protocol and emerging OSI protocols such as Integrated Intermediate System to Intermediate System.

An SNMP agent will come bundled with the device, making it possible to manage the box from an SNMP management station.

IBM declined to commit to a release date for the router but said users can expect to a see a version with limited protocol support by early next year.

What is included in the first release will depend on what protocols are most pervasive in user nets as well as development efforts that IBM can reasonably achieve in that time frame. The "bare minimum" protocols included in the first release will be SNA, NETBIOS, TCP/IP, IPX and DECnet, Fjeld said.

Analysts said IBM's announcement illustrates the vendor's desire to keep its customer base from adopting other vendors' products.

"IBM's window of opportunity is very short," said Jim Harrison, a senior research analyst at the META Group in Westport, Conn. "Those Fortune 1,000 companies that haven't yet chosen a router vendor are in the process of doing so. IBM is essentially trying to freeze the market and get its customers to hold off on a purchase decision until it comes out with its own product."

Fjeld said IBM is developing most of the base router technology internally but is also pursuing partnerships with third-party vendors to aid in developing several protocols for which IBM lacks expertise.

Multiprotocol router stirs user interest

Users applauded IBM's plans to develop a multiprotocol router but said they will reserve judgment about the product until IBM provides more details.

"I'm intrigued, but I need to see what type of special features or functionality IBM will bring to the party," said Len Evenchik, director of communications for the commonwealth of Massachusetts.

The commonwealth has in place a 5,000-device Systems Network Architecture network and local-area networks that support more than 3,000 users and currently uses routers and bridges from several vendors, including Cisco Systems, Inc.

Robin Layland, engineering consultant at The Travelers Insurance Co. in Hartford, Conn., said IBM's announcement has come at the right time. He is currently shopping for routers for use in a large LAN internetwork The Travelers is building. "I would be interested in looking at an IBM product, depending on how soon they can come out with a high-end model," he said.

"The routers we've looked at so far don't quite have the level of maturity we need," Layland said. "IBM might not have the maturity soon enough either, but it's another option we plan to explore."

Bob Beckley, director of technology planning at Brigham & Women's Hospital in Boston, is also interested in IBM routers. "We're currently building a large token-ring network, so I'm glad to see IBM at work on a router as it should have very good token-ring support," he said.

Beckley said routers he currently has from Cisco lack full support for the token-ring environment. "We're interested in seeing what IBM will have to offer us, especially in the area of token-ring support and [Advanced Peer-to-Peer Networking] communications," he said. "But at the same time, we'll be highly sensitive to price and performance issues and how IBM stacks up to competitors."

Users agreed that while they welcome IBM's entrance to the internetworking market, the move may be too late.

"I see IBM's announcement as a good sign because it will likely mean a router that is supported by NetView and Lan Manager," said Michael Kinsey, director of network planning and design at Pennsylvania Blue Shield. "But few users are willing to wait a year for IBM like they did in the old days."

Beckley agreed. "IBM's window of opportunity is short, and they've got to make a move quickly," he said. "Products from existing vendors are continually improving, and IBM may be stuck in the position of playing catch-up."

But others disagreed. According to The Travelers' Layland, IBM will be perceived as a late starter only with non-IBM users. "It's only been within the last year that most IBM shops have stopped viewing LANs as islands and starting talking about internetworking," he said. "Many IBM users are just starting to look at routers, so IBM won't lag as far behind in their own accounts as many people suspect."

— Maureen Molloy

Intel pushes into market

continued from page 8

sell for about $225; the EtherExpress 32 LAN Adapter; and the External Ethernet Twisted-Pair Transceiver, which will be priced at about $150 and can be used to convert coaxial adapters to support unshielded twisted pair.

"Intel will be selling 16-bit boards at prices lower than some companies sell 8-bit boards," one analyst said.

Intel's token-ring product line will include cards for several personal computer buses, analysts said. Products will include the TokenExpress ISA 16/4 LAN Adapter, TokenExpress MCA 16/4 LAN Adapter and TokenExpress EISA 16/4 LAN Adapter, they said. Also, Intel will sell the TokenExpress External UTP Media Filter to enable users to convert their token-ring cards to support unshielded twisted pair. The products will sell for between $700 and $900, an analyst said.

Intel does not make token-ring chipsets and has no immediate plans to do so, the spokeswoman said. Analysts predict Intel will buy token-ring chipsets from Texas Instruments, Inc., which declined to comment, and acquire the adapter board from a European vendor. For that reason, the token-ring cards are not expected to be priced as aggressively as the Ethernet cards.

"Their PC adapter boards are a lot smaller, more intelligent and more highly integrated than a lot of the other boards I've been seeing," an analyst said. "Intel is trying to make LAN administration very easy."

Besides adapter cards, Intel has developed network management products, including software that can be used to upgrade a personal computer or workstation to a network analyzer or monitor, the spokeswoman said.

The net management products will include the NetSight Sentry Monitor, a hardware/software module that lets a net administrator supervise network traffic and evaluate network station activity on Ethernet and token-ring nets; the NetSight Analyst Protocol Analyzer, a software-only analyzer that displays protocol conversions between network stations; and NetSight Management Utilities, a set of tools for managing Novell, Inc. nets.

Another product, the NetSight Professional Protocol Analyzer, is based on Intel's existing EM1000 analyzer, which is sold through OEM channels.

Analysts applauded the new network analyzer software.

"They'll let you walk around your network with a floppy disk and turn any workstation into a protocol analyzer or [LAN] segment monitor," an analyst said.

The new Intel network analyzers will be a direct challenge to products from Network General Corp. and others in the network analyzer market. But Michael Cartsonis, a product marketing engineer at Network General, disagreed. He said Intel's existing network analyzer has not been a threat and doesn't expect the new version to be one either.

Among the other products due out by Intel is Net SatisFAXtion, facsimile server software designed to allow a network user to send and receive faxes from within any Microsoft Corp. Windows or DOS application, analysts said.

Intel will need to be careful not to compete with customers of its chipsets and other products, they added. "Intel's real challenge is not to eat their children," one analyst said. "If they start competing with IBM, Compaq [Computer Corp.] and some of the other companies that got them where they are today, Intel is going to be in trouble."

Vendors in the adapter card market said they will keep an eye on Intel. "When a new competitor with the stature of Intel comes into the market, it's something you want to watch and understand," said Patrick Courtin, president of Proteon, Inc.

Shares of Proteon traded heavily and slipped in value last week after word leaked out that Intel was planning to get into the token-ring adapter market, where Proteon is currently IBM's biggest challenger. Proteon's stock rebounded later in the week.

A spokesman for 3Com Corp. said Intel's expertise resides in hardware and that it will be a challenge for it to match the software expertise of 3Com and other established players in the adapter card business.

SynOptics FDDI components bow

continued from page 1

90 trade show last fall and has been an active participant in the FDDI standards-setting process. Also, the System 3000 was designed to support an FDDI backplane, which SynOptics will roll out with the other FDDI products.

"FDDI has always been a clearly articulated part of SynOptics' strategy," said Rick Kimball, a financial analyst at Montgomery Securities in San Francisco. "Getting into the market now should put SynOptics ahead of the competition."

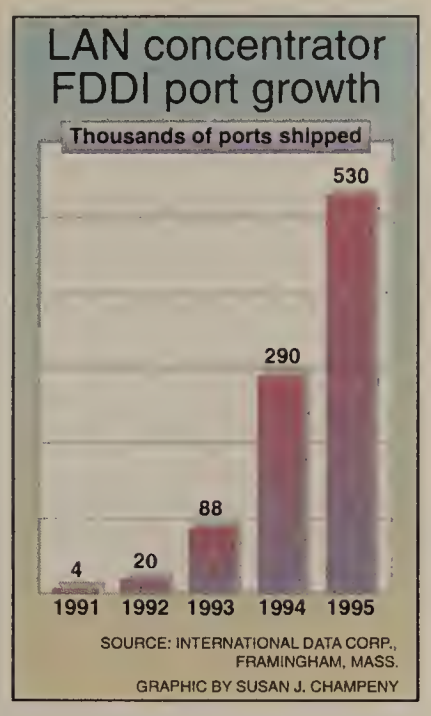
The firm will unveil modules for the System 3000 that enable users to interconnect hubs over standard and shielded twisted-pair FDDI backbone nets. The modules will incorporate what analysts said was a unique technology — an FDDI architecture featuring three, rather than two, counterrotating rings. One ring could be dedicated to network management, while the other two could carry local-area network traffic, providing users with an extra layer of fault tolerance.

"It gives you a virtual 300M bit/sec," according to one analyst who requested anonymity. "It also allows the user to swap a station in and out on one path without taking down the others."

In addition, SynOptics will roll out work group concentrators that support fiber and shielded twisted-pair FDDI connections. They are designed to tie Ethernet or token-ring subnets into an FDDI backbone or to support FDDI to the desktop, an application most analysts think is years away.

Users will be able to deploy concentrators at remote sites that feed into System 3000s over an FDDI backbone. The company plans to provide management support for FDDI nets in the next version of its LattisNet Network Management for Unix product, announced in March.

SynOptics will supply a feature that translates FDDI Station Management data for use by the Simple Network Management Protocol-compatible system, which also manages Ethernet and token-ring nets.



Users said they welcome FDDI support from SynOptics. Jeff Marshall, managing director at Bear, Stearns & Company, Inc., which has a large installed base of SynOptics products, said his company is a potential user of the new FDDI products that could be helpful in handling the huge amount of network traffic generated in the brokerage business.

To date, hub vendors have provided little in the way of FDDI support. Cabletron Systems, Inc., SynOptics' primary competitor in the intelligent wiring hub market, is planning to unveil FDDI products next month, said Michael Welts, marketing manager for Cabletron.

The company already sells an Ethernet-to-FDDI encapsulating bridge dubbed the EFDMIM, he said.

"The general consensus seems to be that widespread use of FDDI is about three years away," Welts said. "But I think you'll start seeing a lot of new FDDI products rolled out in the next 12 to 18 months, and that should help drive the price down and spur usage."

Canadian Bank to upgrade LANs

continued from page 2

internally developed application code on its PowerLan file servers, the Royal Bank of Canada has outstripped its ability to deliver additional functions due to DOS' memory and file size limitations.

Thus, the PowerLan and NetWare nets will be upgraded with Intel Corp. 80486-based IBM Personal System/2 servers running LAN Server, and personal computers on the network will be equipped with OS/2.

The company currently uses an IBM product designed for branch banking applications that serves as a gateway from the LANs and teller terminals to the bank's international Systems Network Architecture net and its five main data centers.

One of the goals of the project, called the Branch Automation Implementation Plan, is to consolidate the functions of the PowerLan server and the gateway by using LAN Server with IBM's Communication Manager.

Oliver said one of the key concerns in implementing the LANs has been remote network management from the data centers because it isn't feasible to train staffers at all 1,600 branches to handle network administration.

In 1989, the bank developed hooks from NetView into the gateway product that enabled net managers to handle network administration and performance measurement on the LANs from consoles in the data centers.

By upgrading the servers and network operating systems, the bank will have the increased diagnostic and remote administration capabilities of LAN Server as well as continued compatibility with NetView.

Oliver said the bank is moving to OS/2 LAN Server as expeditiously as possible in order to pave the way for new relational data base applications. The changeover is also a prerequisite for replacing the teller terminals from IBM and Philips Industries NV installed in the branch offices.

When the new LANs are in place, the terminals will be swapped out for 8,000 diskless 80386 personal computers from IBM running OS/2.

"We have a wealth of applications on our existing banking network and had to make sure we could get equivalent functionality with the LANs," Oliver said.

In addition to core banking applications, the LANs will support general business applications such as word processing, spreadsheets and electronic mail.

The bank will use its SNA network to connect 15,000 LAN-based users of Network Courier, an E-mail program from Consumers Software, Inc., which was acquired earlier this year by Microsoft Corp.

Line of access devices launched

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speed data applications over switched public facilities or private backbones. It is linked to either type of net via a T-1 line or Integrated Services Digital Network Primary Rate Interface (PRI) and supports transmissions over multiple, noncontiguous 56K or 64K bit/sec circuits.

The TAP 5000 can add or decrease capacity dynamically when used with ISDN because of the signaling capabilities of the service. It can also be configured manually when used with T-1 to accommodate changing needs.

The product has four ports, each of which can be outfitted with various interfaces, including RS-530, RS-449, RS-232-C and V.35. It can support multiple sessions and send data to more than one location at a time.

The TAP 5000 is scheduled to ship later this year and will be priced between $5,000 and $9,000, based on configuration.

Other products announced include devices for terminating digital transmission facilities.

Newbridge's new TAP 1000 T-1 Access Processor-Channel Service Unit is just that, an intelligent CSU that provides advanced functions, including speed dialing and signal conversion from D4 to extended superframe formatting. It is expected to be available later this year and will be priced at about $3,000.

The TAP 5500 T-1 Frame Alignment Unit is a DSU/CSU that can take switched 56K or Nx56K bit/sec data traffic from a private branch exchange or other device and put it onto a T-1 or ISDN PRI net. Features include time-of-day reconfiguration and support for up to four data ports and one PBX port. It should be available in the first quarter of next year and will be priced at about $4,000.

The new conversion products include the TAP 2000 T-1/ISDN Primary Rate Convertor, which provides signaling conversion to enable existing customer premises equipment, such as PBXs, to access PRI services.

"You need PRI to access AT&T's Switched 384 service, but a lot of PBXs don't have the capability to support ISDN, or if they do, it's expensive," Kennedy said. "It's easier and less expensive to put the TAP 2000 in front of the PBX to get [56K or 64K bit/sec] data capabilities for video and other applications." The TAP 2000 is expected to be available in the first quarter of 1992 and cost about $4,000.

Other conversion products include the TAP 2100 T-1 to E-1 Convertor, which is used to link domestic T-1 facilities to their European equivalents, and the TAP 4000 E-1/Primary Rate Convertor for linking E-1 lines to domestic ISDN facilities. No availability date or pricing has been set for these products.

Rounding out the product line are: the TAP 3000 Encryption Processor, which encrypts voice or data on a fixed or dynamic basis; the TAP 5100 Transcoder, which provides 2-to-1 voice compression; the TAP 5200 Protection Switch, which provides 1-to-1 T-1 switching upon a link failure; and the TAP 6000 E-1 Network Termination Unit, which provides superrate data capabilities over E-1 or E-1 ISDN links.

Availability and pricing has not been announced for those products.

All the TAP products are software-programmable and can be managed via a MainStreet Network Manager Terminal or basic Digital Equipment Corp. VT-100 terminal.

"Newbridge is the first mux vendor to come out with a product line aimed squarely at the switched digital market," said Jennifer Pigg, an analyst at The Yankee Group, a market research firm in Boston.

Newbridge has entered the market with aggressive pricing and attractive features, including the ability to support multiple sessions, she said.

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Defense Dept. tests EDI net

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of the Defense Department's Electronic Commerce Initiative, announced the launch of the ECON pilot at last week's Second Annual Conference and Exposition on EDI for Government. He said the department will move to an electronic purchasing system that will handle 80% of its business within five years.

The proving grounds

The three-year operational test bed for ECON, designed by Lawrence Livermore National Laboratory, will be the proving ground for an electronic bulletin board system on which procurement officers will post requests for quotation (RFQ) for products costing less than $25 million ("U.S. Defense Dept. to test on-line purchasing system," *NW,* May 20).

Suppliers will be able to post bids by accessing the bulletin board through a variety of value-added network (VAN) carriers.

> The pilot will involve the exchange of X12 EDI transaction sets used for RFQs, vendor quotation responses and purchase orders.
>
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"There have been a lot of false starts," Bartley said, noting that delays in funding had pushed back the anticipated start of ECON by six months.

But Defense Department and Lawrence Livermore officials, who ran a live demonstration of ECON at the conference, said network installation is beginning this week at the lab's site in Livermore, Calif., as well as at the six nationwide procurement offices participating in the pilot program.

Robert Frank, Lawrence Livermore's electronic commerce project leader, said the pilot will involve the exchange of X12 EDI transaction sets used for RFQs, vendor quotation responses and purchase orders.

The Livermore connection

ECON's network design calls for the Livermore lab to serve as a gateway hub for VANs transporting EDI messages among vendors and the procurement offices.

A variety of network transmission means, such as the Defense Data Network or Federal Telecommunications System 2000, will serve as a conduit for EDI messages to the procurement offices.

Frank said the Livermore gateway will integrate hundreds of network systems and electronic bulletin boards used by businesses and government into one system.

Defense Department officials expect six or seven VAN providers to sign contracts letting them pass EDI traffic to the Lawrence Livermore site, probably through T-1 access points. No VAN providers have signed up yet.

Aspects of the network design still need to be ironed out; one official said the hub configuration may call for VANs to collocate their network switches on-site at Livermore.

All department sites, including Livermore, will rely on a key software component, the Intelligent Gateway Processor (IGP), to capture both EDI and electronic mail messages, to provide EDI translation, and to support a remote query-by-mail technique for users operating with a wide variety of computers and software applications. Under the plan, EDI messages will ride inside E-mail envelopes.

The IGP operates on AT&T 3B2 Unix-based computers. According to Frank, the IGP origins date back 10 years and it was developed to help Livermore employees access on-line data in remote computers.

Ready to start

Defense Department procurement officials participating in the ECON trial are eager to begin converting their paper-based systems to EDI. Louis Cosby, deputy commander for the contracting center at Wright-Patterson Air Force base in Dayton, Ohio, said he expected EDI to greatly speed purchase times and reduce costs.

"Wright [Patterson] Air Force base has 100,000 orders per year in small purchases," he said, noting that several local business office suppliers, such as 3M Federal Systems Division, are expected to take part in the pilot.

The IGP software is only required at the department's procurement sites. But Cosby noted that participating suppliers would have to sign up with a VAN provider and purchase EDI translation software for a personal computer to conduct business under ECON.

Initial EDI between the small business suppliers and the six procurement sites is expected to begin in about three months. More participants are expected to be added to the project.

Dean Erwin, system division chief at the Defense Logistics Agency, the center responsible for electronic commerce programs at the Defense Department, said the department will likely require suppliers to support EDI for most procurements by the mid-1990s. He added that the successful rollout of ECON would likely prove a model for civilian agency procurements.

Security is key to ECON

WASHINGTON, D.C. — Security measures will play an important role in the Electronic Commerce Operational Network (ECON), officials at Lawrence Livermore National Laboratory said here last week.

Robert Frank, Livermore's electronic commerce project leader, said the electronic data interchange project will support a variety of public-key encryption methods to authenticate and shield EDI messages. He noted the Department of Defense is enlisting the help of the U.S. Postal Service in support of public-key management for the department under ECON.

"We have all the public-key encryption techniques," Frank said about the ECON pilot test now being started.

He added that ECON support would include a variety of encryption techniques, including RSA Data Security, Inc.'s public-key encryption algorithms, the private-key Data Encryption Standard and the public-key digital signature encryption algorithm expected to be issued by the National Institute of Standards and Technology.

Public-key systems rely on the use of two keys to encrypt a message or authenticate it with the digital signature of the sender. The sender's private key is used to provide encryption or a digital signature, while the sender's public key is used to unlock the message.

However, a management system for issuing public keys to users in business and government needs to be put in place. Frank said the Postal Service will aid in the ECON pilot by providing registration and certification of public keys at selected post offices.

The Postal Service is also expected to provide electronic postmarks or time-and-date stamps for messages.

"The [Defense Department] needs a minimum baseline service," Frank said. "The Postal Service is working to see how they would serve in some role."

— Ellen Messmer

Execs dispel industry myths

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stalled in the its factory in 1988.

"We've been planning on MAP since we installed our broadband network," Goodfellow said. "The reason we didn't [implement] it earlier was because we couldn't justify it. MAP products were too expensive because vendors were trying to [recoup] their research and development costs. But many vendors offer cost-effective MAP products."

While many speakers at the conference emphasized the value of migrating to MAP-based networks, others focused on the people, organizational and business issues that network managers need to address when implementing large-scale projects.

"The network is only as good as the processes the company runs over it," said Leonard Levy, group manager of information management and technology at Digital Equipment Corp. in Littleton, Mass. "Just because you can transfer files or send messages doesn't mean you are effectively communicating or managing."

He said companies that implement networks to link geographically dispersed project team members can expect that projects will be completed 20% to 50% faster than with traditional methods of communicating.

However, companies that redesign the business processes supported by the network can expect to deliver products to market as much as three times more quickly with corresponding quality improvements.

"What used to take two months now takes two days," Levy said.

Conference participants also highlighted the need for full involvement in network projects.

When Northrop Corp. replaced paper work orders on its F/A-18 fighter assembly line with computer terminals, it formed a team of mechanics to determine how the data would be presented on the terminals, according to Gary Lampkins, manager of the paperless system.

"It was critical to give the users of the system responsibility for designing it," he said. "This makes the system more usable and makes mechanics feel it's theirs rather than one imposed on them by management."

Lampkins added that training mechanics was critical. Instead of having outside consultants or Northrop's own trainers to teach mechanics, he trained mechanics to be instructors.

Many conference speakers discussed the importance of identifying business objectives before launching into a major network project.

In 1986, Corning Asahi Video Products Co. initiated a CIM program with help from the corporate engineering group at Corning, Inc. The first thing Corning Asahi's CIM project team did was to identify the company's overall business goals and then draw up a manufacturing plan based on those objectives, according to David Cortese, manager of integrated information and control systems for the company.

MFS to link FDDI LANs

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market need but are also a competitive response to the RBHCs' plans for SMDS," said Mark Lowenstein, a senior analyst with The Yankee Group, a Boston consultancy. "Alternate access carriers have to [roll out] services that differentiate them to compete with the RBHCs."

The new services will give MFS an edge on the RBHCs, which, according to Holland, have been slow to address the LAN interconnection services market. "We see this as a very large potential market. I'm surprised that the RBHCs have not taken advantage of it."

The introduction of LAN interconnection services will help establish MFS as more than just a provider of alternate access and private-line services. "We want users to think of MFS as more than just a bypass [carrier]. We want them to look to us for all kinds of services," he added.

Users applauded MFS' plans.

"We send roughly 90% of our LAN-to-LAN traffic over our T-3 backbone network," said Jeff Marshall, managing director at Bear, Stearns & Company, Inc. "But we will definitely evaluate the MFS services, and I think we'll be able to find a use for them."

NETWORK WORLD

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Network Innovators

Paul Baran

Inventor extraordinaire Baran holds patents for many of networking's most influential technologies, including packet switching.

by Paulina Borsook

While Paul Baran's name may not be familiar to every network manager, his inventions are.

Baran is acknowledged as the developer of packet switching, which he devised in 1964 while an engineer at Rand Corp. For this achievement, the Institute of Electrical and Electronics Engineers, Inc. last year bestowed on him its highest honor, the Alexander Graham Bell Medal.

In addition, Baran holds patents for the high-speed modem technology used in Digitial Communications Associates, Inc.'s Fastlink and Telebit Corp.'s TrailBlazer, for the basic fast packet technology used in StrataCom, Inc.'s products and for the spread-spectrum satellite technology used by Equatorial Communications Co., which was the first very small aperture terminal company.

Baran has not confined his inventions to the communications arena, however. He also devised the doorway metal detectors used in airports, as well as technologies involved in pay-per-view television.

This modern-day Edison is highly regarded by his industry peers for his uncanny technological foresight.

"[Baran] is the kind of guy you'd want to start a company with because you'd be wondering, 'What does he see [now] that will be happening five years from now?' " says Robert Metcalfe, inventor of Ethernet and founder of 3Com Corp.

Beginnings

Baran got accustomed to innovation early in his career. After receiving a bachelor's degree in electrical engineering in 1949 from Drexel University in Philadelphia, he joined the Eckert-Mauchley Computer Co. as a technician for Univac, the first commercial computer.

Following subsequent positions at Raymond Rosen Engineering Products Co. and Hughes Aircraft Co., Baran joined Rand in 1959, the same year he completed his master's degree in electrical engineering at the University of California at Los Angeles. While at Rand in the early 1960s, Baran wrote the 13-volume set *On Distributed Communications,* which mapped out the structure of packet-switched networking. A summary was published in the *Transactions of the IEEE* in 1964.

The work detailed how virtual networks would operate, defined the structure of their packets, and discussed the cyclic redundancy check and flow control algorithms — the basic concepts of what is now called packet switching. The importance of these concepts is well-known now; what isn't, however, is that Baran's work was considered a U.S. national security asset.

During the Cold War climate of the 1950s and 1960s, questions were being asked regarding the U.S.'s ability to survive a preemptive nuclear attack with enough of its military capability intact to launch missiles and send Strategic Air Command bombers to their targets. Rand conducted a study that determined communications was the most vulnerable portion of U.S. command and would come apart quickly should an attack occur.

Baran believed there was a way to strengthen U.S. networks against attacks and began trying to find a solution. He determined that a network based on packet switching would be more robust than its constituent links and switches. It would be "solid enough so that enough parts could survive to talk to each other through the chopped-up mess of a nuclear attack," Baran says.

Baran and his Rand colleagues decided to keep the packet-switching research unclassified. Their reasoning was that if both superpowers knew defense networks could be made to survive sneak attacks, chances of a nuclear war would be reduced. After delays caused by political issues, the government commissioned a public net based on Baran's research. In 1969, the Defense Advanced Research Projects Agency completed the first packet-switched net, dubbed ARPANET.

By that time, Baran had branched out from his packet studies. In 1968, he and several of his Rand coworkers left the company to found the Institute for the Future (IFTF), a nonprofit think tank devoted to helping companies of all types perform long-range planning.

Three years later, Baran left IFTF to cofound Cabledata Associates, Inc., a consulting group/holding company that spawned several offshoots, including Comprint, a computer printer company; Equatorial Communications; Telebit; and Packet Technologies, which subsequently became StrataCom.

"I like entering into a field. There's the most fun at the beginning of a start-up because that's when you don't know if something can be done," Baran says.

His current company, InterFax, Inc., deals with what Baran calls interactive facsimile.

Essentially, interactive fax services allow a user to employ a fax machine to request data from a computer-based information management system. The system can then send the desired information to the user via the fax machine.

"I like entering into a field. There's the most fun at the beginning of a start-up because that's when you don't know if something can be done."

The future

Looking toward the future, Baran says users shouldn't underestimate the impact fiber optics and high-speed technologies, such as the Synchronous Optical Network, will have on computers and communications.

"Any time you increase anything by [orders of magnitude], quantitative changes become qualitative changes," he says. "Look at the difference between the speed at which people walk, an auto travels and a jet flies. [Similarly,] increased data capacity will have profound effects in the future. And the rate of innovation is not slowing down."

Further, Baran says that when fiber-optic technology gets to the point where it is economical for wiring to the home, people should expect major institutional changes in the structure of the communications industry.

Some of these changes will be regulatory. "We will need a new form of regulation as well as a new form of partnership between companies," Baran says. For-profit consortiums, for example, may be needed, such as one where the regional Bell holding companies and the cable companies join forces to build the communications infrastructure of the future.

Baran has firsthand experience with regulatory issues. In 1965, he testified before Congress's Gallagher Committee on the privacy issues raised by the growth of computers and networks, particularly the implications of the census bureau's proposed national file-sharing scheme. Baran was also a consultant to the Federal Communications Commission on the First Computer Inquiry in 1969, translating technical language for lawyers.

"Lawyers [want] things to be black and white, either voice or data," Baran says. "I tried to explain that it's all bits; very early on I [realized] that everything would go digital."

However, Baran stresses that the choice of technology should depend on the requirements of the application. "There are lots of 'techno-bigots' who try to jam solutions to all problems into one technology," he says.

In any event, Baran sees "no reason why the rapid changes of the last 20 years won't continue, both in terms of processing and transmission. Our ability is clearly only bounded by the strange limitations of human nature."

Borsook is a free-lance writer based in New York.

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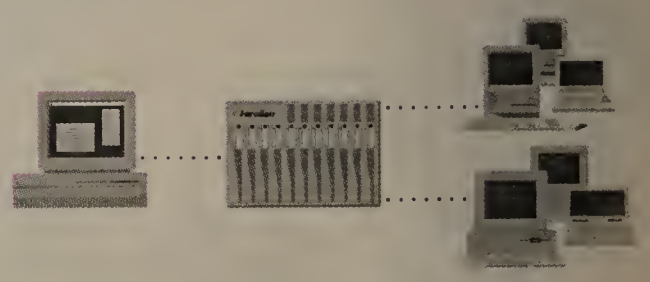

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